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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

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MALARIA

MUDROW-REICHENOW, Lilly. Der moderne Stand der biologischen und chemotherapeutischen Malariaforschung. [**The Present Position of Biological and Therapeutic Research in Malaria**] *Ergebn. Hyg. Bakt. Immunitätsf.* 1952, v. 27, 420–511, 1 fig. [Numerous refs.]

SCHWETZ, J., with the collaboration of H. BAUMANN & M. FORT. Recherches sur le paludisme endémique et le paludisme épidémique dans le Ruanda-Urundi. [**Studies on Endemic and Epidemic Malaria in Ruanda-Urundi**] *Inst. Roy. Colonial Belge. Sect. des Sci. Naturelles et Méd. Mémoires.* (Collection in -8°.) 1948, v. 17, No. 1, 141 pp., 1 folding map. [15 refs.]

RAFI, S. M. & NASIR, A. S. **Malaria and Storm-Water Channels. Malaria Survey of Villages situated along the Hudiara Rohie—a Storm-Water Channel in Lahore District.** *Pakistan J. of Health.* 1952, Apr., v. 2, No. 1, 28–38, 1 map.

Malaria in the Punjab [32°N., 74°E.] is associated with the rainfall occurring in July and August ; incidence is highest and epidemics likely when floods cause overflow of rivers and storm-water channels. Lack of data instigated a malaria survey of 22 villages situated within a mile of a typical storm-water channel, the one selected being named " Hudiara Rohie ". Five villages 10 miles distant from this channel were included for comparative purposes. The survey took place in February and March 1951. The data are summarized in 7 tables, from which the following information is extracted.

Civil Dispensary figures indicate a steady incidence of malaria cases from January to July followed by a marked increase in the remaining months, particularly August to November ; incidence varies from year to year. Average spleen and parasite rates were 70·2 per cent. and 22 per cent. respectively in the affected villages compared with 19·8 per cent. and 13·2 per cent. in the distant villages. The numbers of the anopheline vectors, *Anopheles culicifacies* and *A. stephensi*, were much higher in the villages within close range of the channel. The tabulated birth and death rates for each of the years 1948 to 1950 showed an average of 30·7 and 27·8 respectively compared with 59·2 and 37·9 in the distant villages. Attention is drawn to the difference between the birth and death rates in the two sets of villages but no explanation is offered for the markedly higher death rate in the distant villages. It is evident

that the storm-water channel plays an important part in the incidence of malaria in all the villages along its course, in that, together with the monsoon, it raises in season the sub-soil water level to near the surface, thereby creating extensive breeding places for *A. culicifacies* in ponds and flooded lowlands associated with irrigation systems. Spleen rates decreased with increase in distance from this channel. *R. Ford Tredre*

Heinz, H. J. Neuere Untersuchungen über die Verbreitung von *Anopheles maculipennis* in Hamburg. [**New Studies on the Distribution of** *Anopheles maculipennis* **in Hamburg**] *Ztschr. f. angewante Entom.* 1950, v. 31, No. 2, 304–33, 4 figs. [31 refs.]

Lambrecht, F. L. Anophélisme dans le Mosso-Sud (Urundi). [**Anophelines in the South Mosso Area, Urundi**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 243–6.

The author lists the species of *Anopheles* he collected in 1951–52 in the undulating country in the south-east corner of Urundi and gives the places of collection of both adults and larvae. *Anopheles funestus* and *A. gambiae* were the predominating species and for these two some sporozoite and oöcyst rates are given. The sporozoite rates for *A. funestus* indicate a rise in infectivity from July to November and a fall from November to February. The only figures given for *A. gambiae* show an increase in infectivity from November to February. *H. S. Leeson*

Kartman, L. & Repass, R. P. **The Effects of Desiccation on the Eggs of** *Anopheles quadrimaculatus* **Say.** *Mosquito News.* 1952, June, v. 12, No. 2, 107–10.

The data obtained from these experiments are too meagre to warrant drawing definite conclusions but they do suggest that on the rice fields of Arkansas a drying period of one week would probably kill a majority of the eggs of *Anopheles quadrimaculatus* [see this *Bulletin*, 1941, v. 38, 564]. *H. S. Leeson*

Jeffery, G. M. **The Infection of Mosquitoes by** *Plasmodium vivax* **(Chesson Strain) during the Early Primary Parasitemias.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 612–17.

The capacity of *Anopheles quadrimaculatus* to become infected with *Plasmodium vivax* (Chesson strain) from persons with new sporozoite-induced infections was determined in relation to (*a*) day after parasites were first detected, (*b*) day after gametocytes were detected, and (*c*) height of fever. Mosquito infections were produced on an average 4 days after parasitaemia began and 2 days before gametocytes were detected by ordinary methods. In 4 out of 10 cases, the examination of 0·1 cm. of blood, however, revealed gametocytes (10–20 per cmm.) on the first day of infectivity. A slight degree of fever invariably preceded infection in the mosquito, but frank paroxysms did not occur until a day or so later.

In contrast to these findings, infectivity to mosquitoes occurs earlier in relapses—usually a day or two before the onset of fever and invariably before gametocytes are detectable, the infections themselves being better than those seen in primary parasitaemias. *P. C. C. Garnham*

PARANDE, A. S. **Parasite Phagocytosis in Peripheral Blood in Human Malaria.** *Indian Med. Gaz.* 1952, July, v. 87, No. 7, 306, 1 fig. on pl.

SHUTE, P. G. & MARYON, M. **A Study of Human Malaria Oöcysts as an Aid to Species Diagnosis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, May, v. 46, No. 3, 275–92, 7 pls.

Species diagnosis of blood films containing malaria parasites is a routine practice ; diagnosis of mosquito infections on the other hand is rarely made, and this paper provides a useful guide to workers wishing to distinguish the oöcysts of the different species. Type specimens should be kept for comparison. The details are shown clearly on a table and in numerous illustrations. Briefly, *Plasmodium vivax* develops in a minimum period of 9 days (at 25°C.), 50–100 brown grains of fine pigment form, which assume a " Prince of Wales feathers " pattern after the 4th day. *P. ovale* develops in 15 days, there are 50–60 grains of dark pigment, often in chains crossing at right angles. *P. falciparum* develops in 10 days and the pigment is very coarse, black and in 10–20 granules. *P. malariae* takes 15–21 days to complete its cycle, there is a maximum of 30 granules of pigment which after the 9th day are clumped at the periphery of the oöcyst. Oöcysts of *P. cynomolgi* are indistinguishable in their pigment from those of *P. vivax*, and the pigment of *P. inui* resembles that of *P. malariae*. The oöcysts of avian plasmodia possess scanty pigment in coarse granules.

P. vivax oöcysts will survive a drop of temperature to 5–10°C. for several days (but die if kept at 4°C. for 6 weeks), while those of *P. falciparum* die much more quickly at low temperatures. Mepacrine was given to a patient whose blood contained gametocytes of *P. ovale* ; mosquitoes were allowed to feed on him and the sporozoites proved infective. The oöcysts, however, were found to be devoid of pigment. Early infections of *P. falciparum* treated with mepacrine reacted in the same way. *P. C. C. Garnham*

JAHIER, H. & FABIANI, G. Le paludisme congénital. [**Congenital Malaria**] 32 pp. [69 refs.] [Report presented at *XIII^e Congrès des Pédiatres de Langue Française (Alger, 7–8–9 mai 1951).*]

The extensive literature relating to the transplacental transmission of malaria is subjected to critical review. The paper is divided into three main sections, the first devoted to an examination of the evidence regarding the existence and frequency of congenital malaria, derived from necropsy and the examination of new-born infants and from statistics, the second to a discussion of the mechanism and pathology of congenital malaria, and the third to a consideration of the clinical, prophylactic and therapeutic problems arising from the discussion.

The authors agree with the generally accepted view that transplacental transmission of malaria is an undoubted fact, but note that it is of rare occurrence and that its incidence shows marked regional variation. After reviewing the different hypotheses put forward as to the mechanism by which it is brought about they express the opinion that the evidence available is inconclusive.

Recommendations are put forward for the prophylactic and therapeutic treatment of women showing evidence of malarial infection during pregnancy and confinement, and of their new-born infants. *G. Covell*

CHARDOME, M. & JANSSEN, P. J. Enquête sur l'incidence malarienne par la méthode dermique dans la région du Lubilash (Congo Belge). [**Investigation of the Incidence of Malaria by means of Skin Scarification Smears, at Lubilash, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 209–11.

In 200 people examined by skin scarification smear, 172 were found positive for malaria parasites. Asexual forms of *P. falciparum* (in 77), *P. malariae* (29),

and *P. vivax* (7); combinations of these, some with *P. ovale*, were found in the rest. Gametocytes were common. The authors claim that this is an efficient procedure. [See also this *Bulletin*, 1951, v. 48, 1067.] *Charles Wilcocks*

KIKUTH, W. Veinticinco años de terapéutica antipalúdica. [**Twenty-Five Years of Anti-Malarial Therapy**] *Med. Colonial.* Madrid. 1952, Aug. 1, v. 20, No. 2, 138–54.

A general review by a well-known authority on the subject.

ANSARI, M. Y. **Single Doses of Camoquin in the Treatment of Malaria.** *Indian J. Med. Sci.* 1952, May, v. 6, No. 5, 306–14, 4 figs.

Experiences in treating 28 cases of malaria with single doses of camoquin are described. The doses varied from 7·33 to 10·53 mgm. per kilo body weight, and the patients were followed up over periods ranging from one day to 3 years. The mean time taken for the temperature to reach normal after treatment was 29·9 hours and the range 16–72 hours. Asexual parasites disappeared from the peripheral blood in 1–3 days. Three patients infected with *Plasmodium vivax* are known to have relapsed; it should be noted, however, that of the 18 patients with *P. vivax* malaria, only 7 were followed up for longer than one month.

[The author concludes that "Camoquin, besides, has also been shown to produce a greater reduction in the relapse rate, as compared to paludrine". On the basis of a series in which only 7 patients with *P. vivax* malaria were studied for more than one month and of these 3 relapsed, it is impossible to draw firm conclusions of this kind.

It is further stated that "the effective single doses of camoquin which are likely to reduce the frequency of relapses, lie between 10 mg./Kg. and 11 mg./Kg. of body weight". Yet of the 4 patients followed up for more than one month and who did not relapse, 2 had had less than 10 mgm. per kilo body weight (*viz.*, 7·33 and 9·67 respectively) and 2 more than 10 mgm. per kilo body weight (*viz.*, 10·1 and 10·35 respectively), figures which again hardly support the author's conclusion.] *A. W. Woodruff*

INDER SINGH & KALYANUM, T. S. **The Superiority of "Camoquin" over other Antimalarials.** *Brit. Med. J.* 1952, Aug. 9, 312–15. [18 refs.]

In this investigation various drugs were used in the treatment of malaria in Indian soldiers who had been in endemic and hyperendemic regions of India. The dose of camoquin used was 0·5 gm. once repeated, and of chloroquine 2·5 gm. over 48 hours. In *P. vivax* infections fever persisted for an average of 24 hours and parasitaemia for 40 hours after commencing treatment with camoquin. The corresponding periods in the chloroquine series were respectively 32 and 38 hours. The authors compare these periods with those pertaining in *P. falciparum* infections, but as only two of the latter were treated with chloroquine little is to be learnt from such comparison. They also compare these periods with those following treatment with proguanil, mepacrine, combined proguanil and mepacrine, and combined proguanil and quinine. Except in the case of the last-named combination the comparison favours camoquin and chloroquine.

No relapses were encountered among 23 patients with *P. falciparum* infections followed up for 14–16 months after treatment with camoquin. There were, however, two relapses from among 13 fresh *P. vivax* infections. The authors

compare these results with those following treatment with chloroquine, mepacrine, quinine, and quinine and pamoquin reported by Most *et al.* [this *Bulletin*, 1946, v. 43, 1011 ; 1947, v. 44, 496] from the south-west Pacific in 1946. [Comparisons of this sort are of limited value as different strains of parasites may respond in different ways.]

The authors conclude that camoquin is superior to chloroquine in controlling fever and asexual parasitaemia and in preventing relapses. [In view of the nature of some of the comparisons and the doubtful significance in the difference between figures given, however, these conclusions are not beyond dispute. It should also be borne in mind that many of the Indian soldiers treated probably had some degree of immunity to malaria and that the small dosages used in this study may be less effective in non-immunes.] *A. W. Woodruff*

Hoekenga, M. T. **Treatment of Malaria with a Single Dose of Amodiaquine or Chloroquine.** *J. Amer. Med. Ass.* 1952, Aug. 9, v. 149, No. 15, 1369–71.

This study is based on the treatment of 600 persons of mixed Indian, Negro and Spanish ancestry resident in, or near, La Lima in north-western Honduras, where malaria is endemic throughout the year and where the adult population possesses a high degree of tolerance to the disease. The ages of those treated ranged from 7 to 61 years. Amodiaquine (camoquin) was administered to 380 patients in 4 schedules of 0·4 gm., 0·6 gm., 0·8 gm. and 1·0 gm. of the base, given in a single dose. Chloroquine was administered to 220 patients in 2 schedules of 0·45 gm. and 0·6 gm. of the base, also in a single dose. Details of the experiment are shown in the table reproduced below :—

Doses, gm. of base	Total No. of patients	*P. falciparum*			*P. vivax*		
		No. of patients	Average hours till		No. of patients	Average hours till	
			Temp. remained normal	Parasites disappeared		Temp. remained normal	Parasites disappeared
Amodiaquine	380	185	—	—	195	—	—
1·0	75	33	13·2	26·3	42	15·3	27·5
0·8	80	40	18·5	34·6	40	14·6	25·6
0·6	125	62	17·7	31·1	63	17·8	25·0
0·4	100	50	19·8	30·7	50	18·2	27·6
Chloroquine ...	220	97	—	—	123	—	—
0·6	100	41	20·0	30·2	58	17·4	22·1
0·45 ...	120	52	31·4	41·9	63	19·2	28·5

Six of the chloroquine group failed to respond to treatment, one from the 0·6 gm. schedule, the others from the 0·45 schedule. All responded satisfactorily to re-treatment with a 3-day chloroquine schedule. Three of the amodiaquine group failed to respond, all of whom had been treated by the 0·4 gm. schedule. These responded promptly to re-treatment with 1·0 gm. of the drug.

There were 12 relapses of *P. vivax* malaria, 4 after treatment with 0·4 gm. amodiaquine and the remainder after treatment with one or other of the chloroquine schedules. The toxic effects of both compounds in the dosages used were insignificant. The author concludes that both compounds are applicable for mass treatment in a single small oral dose. *G. Covell*

CHAUDHURI, R. N., RAI CHAUDHURI, M. N. & DUTTA, B. N. **Clinical Trial of M-5943. (A New Chloro Derivative of Proguanil.)** *Indian J. Malariology.* 1951, Sept., v. 5, No. 3, 405–12.

M-5943 differs chemically from proguanil only in having one extra Cl atom in the benzene ring. It has been found considerably more active than proguanil against both the blood forms and the exo-erythrocytic stages of *Plasmodium gallinaceum* and *P. relictum*, but is more toxic against laboratory animals than the latter drug [this *Bulletin*, 1950, v. 47, 1185].

Thirty-two cases of malaria (28 *P. vivax*, 2 *P. falciparum* and 2 *P. malariae*) were treated with M-5943 at the Calcutta School of Tropical Medicine. Two régimes were followed, (A) 20 mgm. thrice daily for 10 days, and (B) 20 mgm. thrice daily for 7 days followed by 2 similar courses for 5 days each at 5-day intervals.

Asexual parasites disappeared in 85 per cent. of the cases and fever subsided in 94 per cent. by the fourth day of treatment. The authors conclude that the action of the drug is slow, and that judging by the small series of cases they have treated it seems to have no advantage over proguanil. The relapse rate, as far as could be observed, was over 30 per cent. Nine of the patients experienced unpleasant side effects, such as nausea and vomiting (5 cases), abdominal pain (2), diarrhoea (1), giddiness (2), dysuria (1) and red patches on the body (1). The symptoms were usually observed about 5 days after the commencement of treatment. The results are shown in 5 tables. *G. Covell*

VAN ROOYEN, C. A. **Cerebral Malaria : Hypertonic Saline in its Treatment.** *South African Med. J.* 1952, Aug. 9, v. 26, No. 32, 657–8.

Three indigenous patients in Ceylon in coma due to cerebral malaria of malignant tertian origin were treated with hypertonic saline solution (120 grains NaCl to the pint) injected intravenously ; two of them had no specific anti-malarial treatment concurrently. In each case consciousness was recovered after the transfusion. The author considers that the treatment freed the cerebral capillaries from their clogging by sporulating parasites, and he suggests that it is rational, harmless, and effective. Among the manifold measures advocated in the older literature he is unaware of any previous reference to the use of hypertonic saline in the treatment of cerebral malaria.

A. R. D. Adams

NOTE

The comment in square brackets which follows the abstract of a paper by SCHNEIDER, MONTÉZIN and BIHEU on p. 666 of this *Bulletin*, 1952, v. 49, should be deleted. When it was made, the abstracter was unaware of the previous work by SCHNEIDER, CANET and DUPOUX (abstracted on p. 664 of the same issue) in which no less than 132 patients were treated with Daraprim. Through an editorial oversight these two papers were not linked up by cross reference when the *Bulletin* was prepared for the Press.

MALAYA, FEDERATION OF : MALARIA ADVISORY BOARD. **Malaria Control by Modern Methods.** *Circular No. 7.* 1952, July, 19 pp., 1 diagram.

This brochure is divided into 4 sections, the first dealing with house spraying with residual insecticides, the second with DDT as a larvicide, the third with suppression by synthetic drugs, and the fourth with the choice of a control

method. There is also an appendix giving working details for residual house spraying, directions for the preparation of DDT emulsions and notes on the breeding habits of Malayan mosquitoes.

Section I provides answers to such questions as what are residual insecticides, how do they act, what results does house spraying give in malaria control, what is its effect on other insect pests, what are the limitations of the method and how often should it be applied? Section II discusses the advantages of DDT as a larvicide, how it should be used for that purpose, how it compares as a larvicide with BHC and other compounds and what is the cost of antilarval measures? Section III gives information as to what synthetic drugs are available, how they suppress malaria, what results they give, what doses are required and their cost and what are the limitations of drug suppression. Section IV sets out the general considerations which govern the choice between different methods of control, discusses the methods applicable for the control of endemic and epidemic malaria, gives useful hints for the personal protection of visitors to malarious areas, and considers the approximate costs of modern methods of malaria control.

Though intended primarily for workers in Malaya, the information contained in this admirable brochure will be found useful to field workers in all countries where malaria is a public health problem. *G. Covell*

VITULLO, D. Andamento dell'endemia malarica nell'Agro Romano in relazione ai metodi di lotta usati. [**Developments in the Malaria Endemicity in the Commune of Rome in relation to the Methods of Control Employed**] *Riv. di Malariologia.* 1952, June, v. 31, Nos. 1/3, 27–39, 2 figs. English summary (6 lines).

A brief account is given of the successive measures that were adopted from 1874 to the outbreak of the second world war in a persistent endeavour to control the ravages caused by malaria in the Roman countryside. The story of the results achieved by *bonification* and attendant measures is well known. In 1940 the malaria morbidity of the population of the Agro Romano had been reduced to 1·61 per cent. Then followed the severe epidemic prevalence of the disease consequent upon war's destruction. In 1945 there were 11,025 cases of malaria recorded among a population of 241,847. In that year the Rockefeller Foundation and UNRRA came to the Government's assistance and soon afterwards DDT residual spraying was begun. The fall in malaria incidence that followed was spectacular. In neither 1950 nor 1951 was there a single case of malaria recorded: the population in the latter year had risen to 322,788. Since 1949 chlordane has been added to the DDT spraying mixture used: the addition was prompted by the appearance of DDT-resistant house-flies.

[Much of the information contained in this paper was also published by SABATINI, see this *Bulletin*, 1951, v. 48, 1071.] *Norman White*

JASWANT SINGH. **Malaria and its Control in India.** *J. Roy. San. Inst.* 1952, Sept., v. 72, No. 5, 515–25, 3 figs. [23 refs.]

After a short introduction the author gives a brief account of the epidemiology of malaria in India, illustrated by a map showing intensity of incidence, and a second map showing the spheres of influence of the chief vectors. He gives a brief history of malaria control and mentions the malaria control organizations which exist in India and the international bodies which are taking part in this work. He gives a list of 9 recommendations which have been submitted to the Planning Commission. *Charles Wilcocks*

Reid, J. A. & Wharton, R. H. **Experiments with Anopheline Larvicides in Flowing Water.** *Med. J. Malaya.* 1952, Mar., v. 6, No. 3, 143–56, 1 fig. [15 refs.]

Over a period of 18 months experiments were done to discover the most economical and effective means of applying larvicides against *Anopheles maculatus*, which breeds in small bodies of flowing water where there are often obstructions or strong films or scums. Trials were done of the following larvicides : ordinary oiling at 25 gallons per acre ; DDT at 4 oz. per acre applied as a 5 per cent. solution in Malariol from a drop bottle or a " force oiler ", or as an emulsion or a suspension of a wettable powder from a knapsack sprayer ; BHC, 2 oz. of gamma isomer per acre, as an emulsion or wettable powder suspension ; dieldrin at 1 oz. per acre as an emulsion ; miscellaneous methods including a DDT oil-bound suspension, 5 per cent. DDT in Malariol on sawdust, BHC or DDT wettable powder briquettes. The drains in a ravine were treated, and observations made of the larvae surviving on the 1st and 7th days after treatment. From a comparison of their killing powers at the above dosages, DDT appeared to be the cheapest of the larvicides used, and the most effective method of applying it to be an oil solution or emulsion. Oil solutions have the advantage that the dose of DDT can be applied in a small volume ($\frac{1}{2}$ gallon of solution per acre), thus reducing the load of the labourer, but in the conditions in which *A. maculatus* breeds an even application is difficult, and emulsions gave slightly better control as well as being 2 or 3 times cheaper. Best results were obtained with a 25 per cent. DDT emulsion concentrate which was diluted with water on the spot so that 25 gallons of the mixture per acre gave a dose of 4 oz. of DDT. One disadvantage of DDT oil solutions and emulsions is that they do not leave any visible trace by which the work can be checked next day, so that careful larva searching should be done.

The probable mode of action of emulsions as larvicides is discussed in an introductory note, with suggestions about the properties required for this purpose. [See also this *Bulletin*, 1950, v. 47, 714 ; 1951, v. 48, 332.]

C. C. Draper

Nair, C. P., Ray, A. P. & Jaswant Singh. **Studies on Toxicity of Proguanil in *S. rhesus* Monkeys.** *Indian J. Malariology.* 1951, Sept., v. 5, No. 3, 425–31. [17 refs.]

Observations on the toxic manifestations produced in *Rhesus* monkeys by intravenous injection of proguanil lactate have already been recorded [this *Bulletin*, 1952, v. 49, 19]. The paper now under consideration deals with acute and toxic manifestations arising after oral administration of proguanil hydrochloride. Two hundred and nineteen animals were used in these experiments.

LD0, LD50 and LD100 were determined to be 55, 200 and 600 mgm. of base per kgm. respectively. The chronic toxic dose varied between 20 and 40 mgm./kgm. Evidence was also forthcoming that in doses much higher than the therapeutic level, *Rhesus* monkeys infected with *Plasmodium knowlesi* are more prone to the toxic effects of the drug than are healthy ones.

G. Covell

Ray, A. P., Nair, C. P., Basu, P. C. & Jaswant Singh. **Action of Proguanil and Pamaquin, Separately and in Combination, against *P. knowlesi* in *S. rhesus* Monkeys.** *Indian J. Malariology.* 1951, Sept., v. 5, No. 3, 413–23. [39 refs.]

The studies here reported were made on monkeys infected with a strain of *Plasmodium knowlesi* which has been maintained for many years at the Malaria

Institute of India, and which since 1947 has become attenuated in virulence so that the majority of animals no longer die if untreated as was formerly the case, but enter a chronic phase, relapsing from time to time over a period of 2 to 3 years. Forty-two monkeys were used for therapeutic tests and 32 for toxicity trials. The results may be summarized as follows :—

1. In non-toxic therapeutic doses schizonticidal action was more rapid with proguanil than with pamaquin.
2. The action of pamaquin against gametocytes was more potent than that of proguanil.
3. A dose of 20 mgm. proguanil with 2·06 mgm. pamaquin per kgm. body weight showed higher efficiency than either of the drugs administered alone.
4. In non-toxic doses gametocyte clearance was obtained much more rapidly with the two drugs combined than with either alone.
5. Relapses occurred with all the régimes adopted, but were least frequent when proguanil was given alone. However, the interval between treatment and relapse appeared to be significantly prolonged under the combined proguanil-pamaquin régime.
6. LD0 in respect of pamaquin and proguanil-pamaquin was determined to be 50 and 55 mgm. respectively per kgm. of body weight of monkeys. LD50 was found to be 75 mgm. with pamaquin and 200 to 250 mgm. with proguanil-pamaquin compound. The results are shown in 5 tables. *G. Covell*

Rodhain, J. *Plasmodium vinckei n. sp.* Un deuxième plasmodium parasite de rongeurs sauvages au Katanga. [*P. vinckei* **n. sp. A Second Plasmodium of Wild Rodents in Katanga**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 275–9, 1 coloured pl.

Levaditi, C. & Vaisman, A. Etude expérimentale des effets anti-paludiques de la terramycine. [**Experimental Study of the Anti-Malarial Activity of Terramycin**] *C.R. Soc. Biol.* 1952, Apr., v. 146, Nos. 7/8, 511–12.

In previous work (*C.R. Acad. Sci.*, 1950, v. 230, 1908) the authors showed that aureomycin at a total dose of 45 mgm. orally resulted in an average survival time of 24 days in mice infected with *Plasmodium berghei* : at a dosage of more than 180 mgm. sterilization of the blood and organs was achieved for at least 60 days. The survival period for control mice was 7 days.

They have now carried out similar experiments with terramycin hydrochloride, given orally to mice of 20 gm. weight either immediately after intraperitoneal infection with *P. berghei* or prophylactically and therapeutically.

In three separate experiments, daily doses of 10 mgm. were given respectively for 7, 9, 12 days from the time of infection. The average survival times were 29·4, 27·6 and 28·6 days : corresponding figures for control mice were 6·5, 6·3 and 7·4 days.

In a fourth experiment, the same dose was given on 2 consecutive days before and 9 days after infection, *i.e.*, to a total of 110 mgm. Of 10 mice used, 8 survived for an average of 29·6 days (controls, 15·2 days) and the remaining two were still alive and free from infection at the end of 105 days when the experiment ceased.

The authors conclude that in mice terramycin at these doses given orally before, and immediately after infection and during its course has a curative effect which takes the form of prolonged survival and, in some cases, of complete sterilization of the blood and organs.

They refer to the experiences of Ruiz-Sanchez *et al.* who claimed a curative action of terramycin in human infections caused by *P. vivax* and *P. falciparum* [this *Bulletin*, 1952, v. 49, 12, 597]. *H. J. O'D. Burke-Gaffney*

Porter, R. J., Laird, R. L. & Dusseau, Elizabeth M. **Studies on Malarial Sporozoites. I. Effect of Various Environmental Conditions.** *Exper. Parasit.* New York. 1952, June, v. 1, No. 3, 229–44, 12 figs. [10 refs.]

The factors determining the survival of sporozoites of malaria *in vitro* are still incompletely known, in spite of the work of Tonkin [this *Bulletin*, 1948, v. 45, 243] and others ; the present paper adds considerably to our knowledge. It is easy to demonstrate qualitatively survival of the sporozoite of *Plasmodium gallinaceum* by merely recording a resultant infection in the inoculated chick ; but in order to determine survival *quantitatively*, it is necessary to measure (*a*) the degree of parasitaemia and (*b*) the length of the prepatent period. Uniform doses of sporozoites were obtainable by placing thoracic contents of infected mosquitoes in heparinized normal chick blood plus saline, " rolling " them into a uniform suspension by rotating with glass rods, and making a smear in which sporozoites were counted against erythrocytes. The effects of different factors were as follows :—

1. Killing the mosquitoes by ether reduced the infectivity of the sporozoites. Light etherization to ensure immobility of the mosquito had no such effect, nor had exposure to DDT, pyrethrum or cigarette smoke.

2. Sporozoites from mosquitoes chilled for 3 hours at temperatures below 0°C. were less infective than normal.

3. Suspending sporozoites in varying strengths of saline (0·21 to 0·85 per cent.) instead of in blood had an adverse effect. Heparinized plasma and inactive serum were as satisfactory as blood which had to be in a concentration above 4 per cent.

4. Storage of sporozoites at temperatures above 26°C. caused considerable diminution of infectivity ; at 21°C., storage in normal serum is less favourable than in saline-blood or inactivated serum (for periods up to 4 hours).

5. The route of inoculation had a profound effect ; intravenous and intrahepatic inoculations were the best, intramuscular, subcutaneous and intraperitoneal inoculations were less good, while intracerebral or oral inoculations only rarely gave positive results.

The following routine is then recommended : immobilize mosquitoes with a little ether or tobacco smoke, dissect out glands into 0·85 per cent. saline, suspend in heparinized chicken blood and inoculate intravenously.

P. C. C. Garnham

Grundmann, A. W., Newson, H. D. & Warnock, R. G. **Non-Human Malaria in Mosquitoes and the English Sparrow, *Passer domesticus* Linn., in the Vicinity of Salt Lake City, Utah.** *Mosquito News.* 1952, June, v. 12, No. 2, 53–7, [11 refs.]

TRYPANOSOMIASIS

Verhaegen, P. & Pieters, G. Un cas de Hémi-Parkinson, causé par la trypanosomose chez un enfant autochtone au Bas-Congo. [**Hemi-Parkinsonism due to Trypanosomiasis in an Infant**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 311–12.

Morris, K. R. S. **The Ecology of Epidemic Sleeping Sickness. II.—The Effects of an Epidemic.** *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 375–96, 3 text figs., 4 maps (1 coloured) & 6 figs. on pl. [13 refs.]

The author has previously given detailed descriptions of the methods of sleeping sickness control used during the last 15 to 20 years in the Northern

Territories of the Gold Coast, especially in the Lawra District [this *Bulletin*, 1947, v. 44, 51 ; 1950, v. 47, 19, 335 ; 1952, v. 49, 21]. In the present paper he considers the effects of an epidemic of sleeping sickness on populations and discusses the broad aspects of the subject in relation to African development and progress ; many references are made to work and observations on sleeping sickness in other British and French territories.

Populations were greatly reduced in numbers, directly by deaths from the disease, and indirectly by the lowered birth-rate which was due to temporary sterility from endocrine disturbance, and by increased infant mortality brought about by the reduced standard of living. The infection rate was directly related to the changes in size of the populations and also to the nearness of villages to the tsetse flies ; where the infection rate was above 3 per cent. the population decreased and where the rate was below 3 per cent. it increased. Both correlations are clearly shown in graphs.

Another result of sleeping sickness was displacement of the people ; when many had died of the disease the people abandoned their villages though they did not associate sleeping sickness with tsetse flies. They left the main rivers and travelled up the tributaries until they reached fly-free places, and this caused temporary overcrowding in some of these places. Wild animals and *Glossina morsitans* invaded the forsaken areas and became a danger to the surrounding populations by destroying their farms and by the risk of infection of their cattle with animal trypanosomes. The resettlement of the displaced populations in sufficient density, after the chief carriers of sleeping sickness *G. palpalis* and *G. tachinoides*, had been effectively dealt with, checked the spread of *G. morsitans* and the depredations of the wild animals.

The author concludes with some observations on the effect which the control of sleeping sickness and other improvements in health and the standard of living may have on the naturally prolific African people ; it has been estimated that the population of Africa will be doubled within 50 years and it is very important that the land shall not be misused by bad husbandry.

J. F. Corson

Fiedler, O. G. H. Der Feldzug gegen die Tsetsefliege im Zululand. [**The Campaign against Tsetse Flies in Zululand**] *Ztschr. f. angewante Entom.* 1950, v. 31, No. 4, 509–36, 9 figs.

The author writes from the Veterinary Research Laboratories, Onderstepoort, South Africa, describing the methods used and the results obtained in the large-scale control of tsetse flies in Zululand with DDT (and later BHC) by sprays and aerosols distributed from aircraft and helicopters, or from ground appliances and smoke bombs. Mention is also made of cattle dips with DDT, bush clearing and the shooting of game. The flies chiefly concerned in this work are *Glossina pallidipes*, *G. brevipalpis* and *G. austeni*.

The work was done as a measure of control of animal trypanosomiasis and is therefore chiefly of interest to veterinarians. The results have been very encouraging. [See also this *Bulletin*, 1948, v. 45, 52.] *Charles Wilcocks*

Schenone F., H., Pizzi P., T., Badínez S., O., Vásquez M., J. & Correa T., E. Primer caso en Chile de demostración de formas Leishmanioides de *Trypanosoma cruzi* en biopsia de ganglio linfático en un caso agudo de Enfermedad de Chagas. [**First Case in Chile Showing Evidence of Leishmanioid Forms of *T. cruzi* in Biopsy of Lymph Gland in an Acute Case of Chagas's Disease**] *Bol. Informaciones Parasitarias Chilenas.* 1952, Jan.–Mar., v. 7, No. 1, 9–10.

DE FREITAS, J. L. P. & FIGUEIREDO, C. Resultados de investigações sorológica sôbre moléstia de Chagas realizadas no Estado de Goiás. [**Serological Study of Chagas's Disease in the State of Goiás**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1951, Dec., v. 16, No. 50, 227–30. English summary.

DE FREITAS, J. L. P. & DE ALMEIDA, J. P. Inquérito sorológico sôbre moléstia de Chagas realizado no município de Echaporã (Estado de São Paulo). [**Serological Survey of Chagas's Disease in the Town of Echaporã, São Paulo, Brazil**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1951, Dec., v. 16, No. 50, 231–6. English summary.

NEGHME, A., BADÍNEZ, O., JARPA, A., THIERMANN, Erica, AGOSIN, M. & CHRISTEN, R. Acción de la cortisona sobre la trypanosomosis chagásica experimental del ratón suprarrenoprivo y total. (Comunicación preliminar.) [**Action of Cortisone on Experimental Chagas's Disease in Mice with and without Adrenalectomy**] *Bol. Informaciones Parasitarias Chilenas.* 1952, Jan.–Mar., v. 7, No. 1, 4–6. [11 refs.]

The English summary appended to the paper is as follows :—

" Confirmatory evidence of the increased susceptibility of cortisone-treated ' Dba ' mice to *Trypanosoma cruzi* infections, is presented in this paper. The adrenalectomy also increases the severity of the infection in mice. The administration of Cortisone has no effect on the survival of the operated mice, and therefore is concluded that the aggravation may be the consequence of the involution of the adrenals, through an inhibition of the hypophysis."

LEISHMANIASIS

MOHIUDDIN, A. **An Investigation into the Relationships between the Species (Parasitic in Man) of the Genus *Leishmania* Ross, 1903. Part I. A Study of the Cultural Characters and Morphology with a Statistical Analysis of the Relative Measurements of the various Species.** *Indian J. Med. Res.* 1952, Jan., v. 40. No. 1, 7–23, 12 figs. on 4 pls. [28 refs.]

A condensed version of the thesis reviewed in this *Bulletin*, 1950, v. 47, 828.

DOSTROVSKY, A., ZUCKERMAN, A. & SAGHER, F. [**Successful Experimental Superinfection of *Leishmania tropica* in Patients with Relapsing Cutaneous Leishmaniasis**] *Harefuah.* Jerusalem. 1952, Aug. 1, v. 43, No. 3 [in Hebrew 29–30. English summary 30].

The senior author and Sagher have already made observations on the form of recurring cutaneous leishmaniasis which they called " leishmaniasis recidiva " [this *Bulletin*, 1935, v. 32, 89 ; 1937, v. 34, 577 ; 1947, v. 44, 889].

With Zuckerman, they now describe an experiment to determine whether patients with this condition were susceptible to superinfection with cultures of a strain of *L. tropica* capable of producing primary lesions in those not previously exposed to leishmanial infection. Six such patients were given intradermal inoculations of 1–10 million washed-culture flagellates of *L. tropica*. Juice from the developed lesions showed positive cultures in 5 cases in 1 to 15 weeks : only one culture was made from the sixth patient, and since in the other 5 subjects positive results were found in each case only once in repeated cultures, the sixth patient may well also have been susceptible.

The superinfection lesions closely resembled those of relapse, rather than initial lesions, in clinical and histological appearances and in the paucity of parasites found in them.

This development of a lesion resembling the relapse type at the site of superinfection in cases of recurring cutaneous leishmaniasis is designated by the authors an " isophasic reaction ". *H. J. O'D. Burke-Gaffney*

Abu Shusha, E. S. K. **Leishmaniasis of Eye-Lid. Review of the Disease and Report of Two Cases.** *Bull. Ophthalm. Soc. Egypt.* 1949, v. 42, 239–47, 4 figs.

Guimarães, F. N. Leishmaniose experimental. IV–Reprodução em Hamsters (*Cricetus auratus*) de uma leishmaniose cutânea nódulo-tumoral oriunda da Amazônia. (Histiocitoma leishmaniótico.) [**Experimental Leishmaniasis**] *Hospital.* Rio de Janeiro. 1951, Nov., v. 40, No. 5, 665–76, 8 figs.

The English summary appended to the paper is as follows :—

" The visceralisation of *Leishmania brasiliensis* in Hamster (*Cricetus auratus*) and mice, and the behaviour of 6 strains of the same leishmaniae in the organisms of these animals, were related in previous papers. The findings were similar to those observed in kala-azar, independent of the via of inoculation.

" In this paper, studies on pathogenesis of a new strain of *L. brasiliensis* obtained from a case of tegumentary leishmaniasis of Amazonia, are reported. The clinical aspects of this case are very interesting, principally by the presence of dermal tumors formed by the proliferation of histocytes, many of them plain [full] of leishmaniae. This strain provoked no visceral lesions when injected in the Hamsters.

" Thus, from 14 Hamsters inoculated, 2 animals only showed very few leishmaniae in the liver, and one in the smears of the heart, but the parasites were not seen in the sections. However, from 8 Hamsters injected in the skin of the nose, all of them developed nodulo-tumoral lesions, clinical and histopathologically similar to those of the patient.

" Histopathologically, in the Hamster like in the patient, we verify a rich proliferation of histocytes in the derme with abundance of leishmaniae (leishmanic histocytome).

" One Hamster, infected during 9 months and with persistent lesion on the nose, showed metastatic lesions with the same histological structures in the ears and anterior right paw.

" None of the 6 Hamsters injected in the peritoneal cavity, present skin lesions. Two of them, and 3 more of those 8 injected in the nose, developed periorchitis similar to that obtained in several Hamsters inoculated with the 6 strains of *L. brasiliensis* referred above. The periorchitis, common to the pathogenesis of all the members of the genera Leishmania, will be studied more minutely in the next paper, treating of the behaviour of this amazonian strain of *L. brasiliensis* in the mice.

" The dissimilarities of this strain, when compared with the other 6 above mentioned, suggest we have met a variety of the species *L. brasiliensis*."

Guimarães, F. N. Leishmaniose experimental. III. A) Comportamento da " L. brasiliensis " em camundongos (*Mus musculus*, var. *albina*). B) Infecções ligeiras em " Cotton-Rats " (*Sigmodum hispidus hispidus*). C) Animais refratários. [**Experimental Leishmaniasis. (A) Behaviour of *L. brasiliensis* in *Mus musculus* var. *albina*. (B) Light Infections in Cotton-Rats. (C) Refractory Animals**] *Hospital.* Rio de Janeiro. 1951, Aug., v. 40, No. 2, 153–62, 1 fig. [29 refs.]

The English summary appended to the paper is as follows :—

" Four strains of *Leishmania brasiliensis* produced visceral infections in white mice, but the lesions are not so extensive and severe than those provoked in hamsters by the same leishmania.

" From 32 white mice inoculated intraperitoneally, 14 gave positive result (43·4%) ; from 25 injected sub-cutaneously, 8 gave positive result (36%) [this last figure should be 32].

" No lesions were observed in the site of inoculation. The lesions obtained were indistinguishable to those attributed to *L. donovani*. In order of positivity the infected organs were the following : testes (vaginal), heart, intestine, liver, spleen, lungs, skeletal muscles, skin and kidneys. Focal myocarditis is similar to that of the experimental Chagas' disease.

" Similarly, both black and agouti mice showed susceptibility to *L. brasiliensis*.

" From 2 white mice inoculated with cultures, recently isolated, only one was positive.

" Cotton-rats showed only slight visceral infection. From 8 injected with saline emulsions of infected organs, two were positive with few leishmaniae in internal organs ; and all of 4 inoculated with cultures, were negative.

" Several animals were refractory to the employed strains of *L. brasiliensis*."

FEVERS OF THE TYPHUS GROUP

Mooser, H. El papel que jugó el tifo en México en el estudio de las rickettsiosis. Una reseña historica. [**The Part Played by Typhus in Mexico in the Study of Rickettsiosis. A Historical Review**] *Higiene*. México. 1952, Jan.–Feb., v. 1, No. 1, 5–15.

Neva, F. A. & Snyder, J. C. **Studies on the Toxicity of Typhus Rickettsiae. I. Susceptibility of the White Rat, with a Note on Pathologic Changes.** *J. Infect. Dis.* 1952, July–Aug., v. 91, No. 1, 72–8. [21 refs.]

" Susceptibility of the white rat to the toxic properties of intravenously administered living typhus rickettsiae is reported. Evidence is presented which shows that the toxicity is due specifically to living typhus rickettsiae and is similar to the phenomenon in white mice.

" In repeated titrations of the toxic dose for rats as compared with mice, it was shown that the white rat is as susceptible as the mouse on a body weight basis to acute toxicity with epidemic typhus rickettsiae, but more resistant than the mouse to toxicity with rickettsiae of murine typhus.

" Gross pathologic changes were observed in the small intestine of white rats dying of acute rickettsial toxicity."

Giroud, P., Le Gac, P., Brizard, H. & Laurent, C. Comportement dee sérums de divers animaux domestiques, de l'Oubangui-Chari, vis-à-vis ds l'antigène épidémique. [**Reactions of various Domestic Animals in Oubangui-Chari to Antigens of Epidemic Typhus**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 313–16.

In agglutination tests of the sera of 128 domestic animals at Oubangui-Chari, *Rickettsia prowazeki* was chosen as the antigen because it was found to give positive reactions among laboratory animals inoculated with rickettsiae of boutonneuse fever as well as among those inoculated with epidemic typhus. Among patients suffering from boutonneuse fever the mouse-protection test became strongly positive against epidemic typhus and among 10 patients 13 out of 20 agglutination tests with *R. prowazeki* were positive at titres of 1–80 to 1–1,280 ; *R. mooseri* was agglutinated in 8 of the 20 tests at titres of 1–80 to 1–320 and the Weil-Felix reaction was positive in only 4 of the tests.

R. prowazeki was agglutinated by sera of 13 out of 30 healthy cattle at titres of 1–80 to 1–320. Other animals reacting at these titres were : 3 of 6 goats ; 12 of 17 asses ; and 33 of 52 dogs.

The authors regard these findings as justifying the suggestion that domestic animals may be natural reservoirs of epidemic or boutonneuse typhus but they add that a final opinion cannot be given till the organisms have been isolated from the animals. The findings might also be regarded as throwing doubts on the specificity of the antigens concerned in the agglutination.

John W. D. Megaw

Gear, J., Wolstenholme, B., Harwin, R. & Stakes, F. H. **Brill's Disease (Recrudescent Epidemic Typhus Fever) : its Occurrence in South Africa.** *South African Med. J.* 1952, July 12, v. 26, No. 28, 566–9. [12 refs.]

The authors have seen 6 cases of classical Brill's disease in South Africa during the past 10 years. All the patients were born in East Europe and suffered many years later from attacks of fever due to *Rickettsia prowazeki*.

One case is described in detail. The patient was born 73 years ago in West Russia where he had a severe attack of typhus fever at the age of 7. The present illness occurred in Johannesburg in December, 1951. The complement-fixation test with *R. prowazeki* was positive at a titre rising to 1–3,200 ; with *R. mooseri* the titre rose to 1–800.

There was a dramatic response to treatment with aureomycin in doses of 0·25 gm., given 4-hourly.

The authors conclude that in view of the experience of Smadel in scrub typhus, antibiotic treatment will not prevent the survival of rickettsiae after attacks of fevers of the typhus group so that a community which has had an epidemic of typhus fever " remains a potential reservoir of the rickettsiae for the lifetime of the infected generation ".

John W. D. Megaw

Masturzo, M. Sulle manifestazioni orali del dermotifo. [**Oral Lesions in Exanthematic Typhus**] *Acta Med. Italica.* 1951, Dec., v. 6, No. 12, 334–43, 11 figs. [72 refs.] English summary.

A detailed description, illustrated with 11 photomicrographs, is given of the lesions occurring in the mouth in louse-borne typhus. Stomatitis, periodontitis and glossitis are shown to be caused in the same way as the lesions in the skin and other tissues of typhus patients. The primary cause is the occurrence of degenerative and proliferative changes in the small blood vessels ; the devitalization of the tissues resulting from these accounts for the frequency of secondary bacterial complications. The subject is dealt with in a comprehensive manner ; the bibliography contains 72 references.

John W. D. Megaw

Wertman, K., Crisley, F. D. & Sarandria, J. L. **Complement-Fixing Murine Typhus Antibodies in Vitamin Deficiency States. III. Riboflavin and Folic Acid Deficiencies.** *Proc. Soc. Exper. Biol. & Med.* 1952, July, v. 80, No. 3, 404–6. [10 refs.]

The authors describe further studies of the influence of vitamin-deficient diets on the development of complement-fixing antibodies among rats inoculated with immunizing antigens [this *Bulletin*, 1952, v. 49, 256].

Groups of weanling rats were kept on the following diets, of which full details are given :—I. Riboflavin-deficient ; II. Folic-acid-deficient ; III. Inanition diet, not deficient in vitamins but restricted so as to cause about the same retardation of growth as was caused by the deficiency diets ; IV. An ideal diet.

When the effects of the diet deficiency became obvious all the rats were given a single dose of murine-typhus antigen ; 28 of the 39 rats of groups III and IV

responded 7 days later by complement-fixing titres of 1–10 to 1–160 and 11 gave negative reactions. All the rats on vitamin-deficiency diets gave negative reactions.

Two further injections of antigen were given at weekly intervals; the responses are shown in the table.

Diet	Complement-fixation titres after 3 injections.						
	Number of rats	Neg.	1–10 to 1–80	1–160 to 1–320	1–640 to 1–1,280	Weight of rats	
						Initial	Final
Riboflavin deficiency ...	26*	0	2	13	9	51	93
Inanition ...	10	0	0	0	10	49	92
Ideal	9	0	0	4	5	53	296
Folic acid deficiency ...	25†	1	15	1	1	39	126
Inanition ...	10	0	0	1	9	38	121
Ideal	10	0	0	3	7	38	311

*Two died. †Seven died.

Among the rats fed on both types of deficiency diets there was a significant reduction in the development of complement-fixing antibodies in response to a single dose of antigen. After 3 injections there was still a pronounced reduction among the rats deprived of folic acid and a much less pronounced reduction among those deprived of riboflavin. There was no reduction among the rats fed on an inanition diet. *John W. D. Megaw*

Eustis, Elizabeth B. & Fuller, H. S. **Rickettsialpox. II. Recovery of *Rickettsia akari* from Mites, *Allodermanyssus sanguineus*, from West Hartford, Conn.** *Proc. Soc. Exper. Biol. & Med.* 1952, July, v. 80, No. 3, 546–9.

In December, 1951 and January, 1952, 7 cases of rickettsialpox occurred in an apartment house in West Hartford, Connecticut. From suspensions of mites (*Allodermanyssus sanguineus*) collected from the walls of incinerators in the basement of the house *Rickettsia akari* was isolated by mouse inoculation and also by direct yolk-sac culture.

The organism was fully identified by comparison of its complement-fixing antigens with those of a standard strain and by cross-immunity tests on inoculated mice. The recovery of the strain by direct yolk-sac inoculation is of special interest; the technique employed is described.

R. akari has hitherto been fully identified only in New York and Boston; it is described by the authors as a member of the Rocky Mountain spotted fever group of rickettsiae, presumably on the strength of the close relationship between the complement-fixing antigens of *R. rickettsi* and *R. akari*. [See also this *Bulletin*, 1952, v. 49, 35.] *John W. D. Megaw*

Calero M., C., Núñez, J. M. & Silva Goytía, R. **Rocky Mountain Spotted Fever in Panama. Report of Two Cases.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 631–6, 2 figs.

Two cases of Rocky Mountain spotted fever are described as occurring in Panama in January and April, 1951. The diagnosis was confirmed by the

complement-fixation test, which in one case was positive with a standard antigen at a titre of 1–16 on the 10th day and of 1–64 on the 24th day ; the Weil-Felix reaction on the 24th day was positive with *Proteus OX*2 at 1–80 and with *P.OX*19 at 1–40. In the other case the fixation reaction was positive at 1–64 on the 12th day and at 1–256 on the 32nd day ; 10 months later the titre was 1–512. The Weil-Felix reaction was negative on the 9th and 13th days. Two previous cases have been reported from Panama in 1950 [see this *Bulletin*, 1951, v. 48, 28]. Cases have now been seen in 3 widely separated areas so it is believed that the disease may occur throughout the Isthmus.

An epidemiological study of the disease in Panama is in progress and a further report is promised. *John W. D. Megaw*

Bingel, K. F., Laier, Ruth & Mannhardt, S. Epidemiologische Studien zu 3 Q-Fieberausbrüchen. [**Epidemiological Studies of Three Outbreaks of Q Fever**] *Ztschr. f. Hyg. u. Infektionskr.* 1952, July 8, v. 134, No. 6, 635–50, 9 figs. [26 refs.]

In 2 of 3 outbreaks of Q fever which were thoroughly studied there was strong evidence that the infection was chiefly by inhalation of infected dust from maize grain used as a feeding stuff for cattle. Among 82 confirmed cases 54 of the patients were found to have been closely associated with the handling of the maize and 5 others were probably contact cases.

Among 96 persons who handled the suspected grain 57 per cent. were attacked, whereas only 2·6 per cent. of the whole population were attacked.

R. burneti was isolated from a mixture of dust and grain collected from the sacks in which the maize had been stored.

There was no clear evidence of the source of infection in the third outbreak. Full details are given of the investigation and references are given to 26 contributions to the literature of the subject by other workers.

John W. D. Megaw

Schmid, E. E., Jayasundera, L. B. T. & Velaudapillai, T. **Survey on the Occurrence of Q-Fever in Ceylon.** *Ceylon Med. J.* (n.s.) 1952, May, v. 1, No. 1, 65–8. [46 refs.]

The authors describe a preliminary survey of the incidence of complement-fixing antibodies of Q fever in Ceylon. Antigens for the tests were supplied by the World Health Organization.

At the Colombo slaughter house 3·97 per cent. of the 151 persons employed reacted at titres of 1–16 to 1–256. All the positive reactions were among persons employed in skinning the animals or handling their hides.

No positive reactions occurred among the following groups of persons :— 292 workers in tanneries or government leather factories ; 17 workers in the cattle market ; 39 dairy workers ; and 69 persons employed in cold storage of cream or meat.

Among groups of 100 to 104 of each of the following animals the percentages of positive reactions were :—buffaloes 2·0 ; cattle, 3·0 ; goats, 7·69 ; pigs, 0·0 ; and sheep, 1·96.

Among 1,164 samples of serum sent from all over Ceylon for Widal or Weil-Felix tests 21 (1·80 per cent.) reacted ; of these one was positive at 1–1,024 ; 2 at 1–64 ; 6 at 1–32 and 12 at 1–16. In contrast with these figures only 3 of 4,700 sera gave positive reactions with the Weil-Felix test.

A clinical case is described in a separate paper ; the fever lasted about 28 days ; about the 20th day the complement-fixation test was positive at 1–1,024 and 15 days later the titre was 1–512. *John W. D. Megaw*

HARMAN, J. B. **Q Fever.** *Postgraduate Med. J.* 1952, Sept., v. 28, No. 323, 481–4.
A general account.

YELLOW FEVER

BUXTON, A. P.* **Observations on the Diurnal Behaviour of the Redtail Monkey (*Cercopithecus ascanius schmidti* Matschie) in a Small Forest in Uganda.** *J. Animal Ecology.* 1952, May, v. 21, No. 1, 25–58, 9 figs. [21 refs.]

The redtail monkey in Uganda shows the highest standardized immune rate (52·9 per cent.) to yellow fever of all the monkey species adequately sampled. The grivet (*Cercopithecus ascanius centralis* Neumann), which is mainly terrestrial by day, showed a significantly lower rate (35·0 per cent.) even when samples were taken from the same area. It was decided, therefore, that an investigation of the habits of these two species might yield results of importance in relation to the epidemiology of yellow fever.

The present article deals with a study, carried out with the aid of African observers, on the redtail monkey in the Zika Forest, a small forest seven miles inland from Entebbe Township, which contained a population of about 35 redtails. The results are based on 1,559 man-hours of observation by Africans stationed in different parts of the forest. The animals showed a marked activity rhythm which differed in the two forest types. Those in the raised forest were active at sunrise and sunset with little movement in between, whilst those living in the swamp forest showed marked peaks of activity at about 08.00 and 15.30 hours. Heavy rain inhibited activity and high sun temperatures in the middle of the day reduced it. The animal fed heavily at dawn and continued feeding until midday and fed again from about 13.30 hours till sunset. It fed mainly in the raised forest.

The mean group-size, excluding solitary individuals, was about four monkeys, typically consisting of an adult male, one or two adult females and none, one or two young. The group sleeps in the lower part of the canopy of a mature forest tree or in the upper branches of a lower tree. The high canopy and understorey growth were little occupied by the redtail. The animals wandered over considerable areas of the forest during the course of a few days and would obviously be capable of disseminating a virus or other pathogenic organism throughout the biting-insect population of the forest canopy. The redtail was also found to sleep in relatively small groups of three or four individuals, which would increase the frequency of being bitten by vectors as compared with the grivet monkey which sleeps in groups of about 20 individuals. At certain times of the day, principally about 09.00 hours and between 14.00 and 16.00 hours, bands of more than ten redtails were observed but they always broke up into groups before night. The redtails in Zika Forest did not occupy the same sleeping trees regularly and the mean size of the groups was smaller than in Mongiro Forest. *E. Hindle*

LE GAC, P., ROUBY, M. & DIENG, C. Symptomatologie amarile dans un cas d'hépato-néphrite pneumococcique observé chez une indigène de l'Oubangui-Chari. Difficultés du diagnostic. [**Difficulties in Diagnosis in a Case of Pneumococcal Hepato-Nephritis Clinically Resembling Yellow Fever in an African in Oubangui-Chari**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 292–4.

*An editorial footnote to the paper records the sad news that the author died in Uganda a few days before this paper went to Press.

RABIES

WOLMAN, M. & BEHAR, A. **A Cytochemical Study of the Nature of Negri Bodies.** *J. Infect. Dis.* 1952, July–Aug., v. 91, No. 1, 69–71, 4 figs. [This summary appears also in *Bulletin of Hygiene.*]

" In white mice injected intracerebrally with street rabies virus the following consecutive changes were found :

" Within one day of injection minute, basophilic, Feulgen-positive inclusions were noted. These inclusions subsequently grew in size, often became embedded in a Feulgen-negative matrix, and increased in number. From the sixth day on a progressively increasing proportion of inclusions became amorphous, eosinophilic and Feulgen-negative.

" The Feulgen-positive inclusions were also positive for alkaline phosphatase and cholinesterase, and weakly positive for lipase. The decrease of these reactions paralleled the decrease in basophilia and Feulgen positivity.

" The findings are considered to corroborate the assumption that inclusion bodies represent virus particles aggregates in which the virus particles multiply up to a certain limit, and then diminish in number."

REMLINGER, P. & BAILLY, J. Propiedades del suero de perros refractarios a la rabia. [**Properties of Serum from Dogs Resistant to Rabies**] *Med. Colonial.* Madrid. 1952, Aug. 1, v. 20, No. 2, 103–7.

PLAGUE

MACARTHUR, W. P. **" Plague of the Philistines ".** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, July, v. 46, No. 4, 464.

The author refers to his earlier letter dealing with, *inter alia*, the antiquity of the rat in Palestine [this *Bulletin*, 1952, v. 49, 388] and now records information that the skeleton of a rat, indistinguishable from that of *R. rattus*, has recently been discovered in an excavation of a neolithic site in the Abu Uba cave, Mount Carmel. The discovery was made by Professor HAAS, Professor of Comparative Anatomy, Hebrew University, Jerusalem. In other excavations of a palaeolithic site in the desert of Judea, Professor Haas found another rat skeleton belonging to the genus *Rattus*. The great antiquity of the rat in Palestine is thus clear.

The author challenges the suggestion that " mice that mar the land " might refer to the destructive vole *Microtus guentheri*. The word translated " land " can also mean " people-of-the-land " : also, it is clear from the Biblical narrative that it was the five cities of the Philistines which were stricken and the other rodent suggested would not have invaded them. *H. J. O'D. Burke-Gaffney*

INNES, R. R. **History of Plague in the Southern Transvaal 1899-1951 and the Activities of the Reef Plague Field Committee of 1951.** *Pub. Health.* Johannesburg. 1952, July, v. 16, No. 7, 138–46, 2 figs.

The paper contains a history of plague in the Transvaal and a description of the energetic action that is being taken to eliminate the infection existing among the rodents of the Reef area which is about 250 square miles in extent and borders on the outskirts of Johannesburg, thus forming a threat to the city as well as to important mining centres which lie in the affected area.

Since 1939 there have been a few small local outbreaks or single cases of plague in the area. The last recorded case occurred in July 1950 in a " shanty "

town adjoining a slum township of 34,000 inhabitants in the outskirts of Johannesburg. Immediate and vigorous action was taken, including the dusting of 5,829 dwellings with a mixture containing 10 per cent. of DDT and 5 per cent. BHC ; 4,034 of these houses were also treated with a 50 per cent. BHC fog. In August the Reef Plague Field Committee was formed as a voluntary body consisting of representatives of all the health authorities in the area and in Johannesburg. The aims of the committee are to maintain a constant field survey of the rodent and flea population, to " wipe out " epizootic infection whenever it appears and to deal promptly with any human outbreaks that may occur.

By the end of September 31 plague-infected spots were discovered and action was taken to eliminate gerbils and their fleas ; all burrows were first dusted with DDT and on successive days the gerbils were destroyed by combined poisoning, gassing and trapping. From September 1950 to May 1951, rodent plague had apparently disappeared, but between the latter date and November 1951 14 foci of rodent infection were found in the localities previously infected. In March 1951 rat plague was detected in 2 localities in Johannesburg ; these were promptly cleared of rodents and fleas.

The author believes that the ultimate aim of eliminating the plague focus is a practicable one.

It will be a feather in the cap of the Reef Committee if they succeed in achieving this difficult and elusive aim. *John W. D. Megaw*

Rockenmacher, M., James, H. A. & Elberg, S. S. **Studies on the Nutrition and Physiology of *Pasteurella pestis*. I. A Chemically Defined Culture Medium for *Pasteurella pestis*.** *J. Bacteriology.* 1952, June, v. 63, No. 6, 785–94. [25 refs.]

The authors tested the chemically defined culture media formulated by previous workers [Rao, this *Bulletin*, 1939, v. 36, 963 ; Berkman, *ibid.*, 1943, v. 40, 538 ; Doudoroff, *ibid.*, 775 ; Herbert, *ibid.*, 1950, v. 47, 1195] and found that all of them failed to support the growth of any of the 27 strains of *Pasteurella pestis* available in their laboratory.

A new medium is described ; it is called synthetic casein (S C) because it approximates to the amino-acid composition of casein. It contains no added growth factors.

Abundant growth of 27 strains, virulent and avirulent, of *P. pestis* was obtained in the liquid form of the medium and repeated subcultures were made in which the virulent strains showed no loss of virulence. When used as a solid agar medium haematin or blood had to be added or incubation had to be at a greatly reduced atmospheric pressure to obtain satisfactory growth. No explanation can be given of the difference in the behaviour of *P. pestis* in solid as compared with liquid media, in the latter of which growth is promoted by normal or even increased oxygen tension.

The medium contains 18 amino acids, 4 mineral salts, and glucose, in phosphate buffer solution. Full details are given of the composition and method of preparation of the medium. *John W. D. Megaw*

Sokhey, S. S. **The Lag Phase in the Growth-Curve of *Pasteurella pestis*.** *Bull. World Health Organization.* 1952, v. 6, Nos. 1/2, 65–72.

Amies, C. R. **Salt Preservation of Rodent Specimens for Plague Examination.** *Pub. Health.* Johannesburg. 1952, Aug., v. 16, No. 8, 169–70.

Pasteurella pestis soon dies in the presence of putrefactive organisms, and current methods of preserving the bodies of suspected rodents, for several days,

without killing the organisms, are often unsuccessful. Kerosene does not prevent putrefaction, and strong antiseptics kill *P. pestis* before the putrefactive organisms. The author has overcome these difficulties by using common salt. The suspected animal is placed in a dry jar with a screw cap, and 2–3 ounces of salt are added, the cap then being screwed down tight. By rotating the bottle the salt can be made to cover the body entirely, and the animal will then keep in good condition (for 67 days in one experiment). Cultures are best made from the marrow of the femur.

This method has been in routine use in South Africa for 10 months, with success provided that the animals are reasonably fresh when packed.

Charles Wilcocks

HOLDENRIED, R. **Sylvatic Plague Studies. VIII. Notes on the Alimentary and Reproductive Tracts of Fleas, made during Experimental Studies of Plague.** *J. Parasitology.* 1952, Aug., v. 38, No. 4, Sect. 1, 289–92.

"Live *D[iamanus] montanus, P[olygenis] gwyni* and *X[enopsylla] cheopis* were examined microscopically and the following observations were made: (1) Clear globules formed in the ventriculi of *D. montanus* and *X. cheopis*, but not of *P. gwyni*. Bubbles present in some starved *P. gwyni* are rapidly eliminated after feeding. (2) Persistence of dark particles in the ventriculus after ingestion of a fresh meal of blood containing *Past. pestis* indicate that the flea is plague-infected. Visible remains of previous blood meals in normal fleas may disappear in as little as 24 hours, but occasionally persist for as long as 10 days. (3) Continued action of the pharyngeal pump in fleas with plugged alimentary canals is most persistent and vigorous prior to death in *P. gwyni*. This also occurred in other species. (4) The abdomen of a flea with its digestive tract obstructed with a plug containing plague organisms may telescope anteriorly forcing the proventriculus into the pronotum, displacing the esophagus. (5) The amount and rate of feces expelled does not seem to affect the rate at which fleas become free of plague organisms. (6) Plague-infected fleas are capable of egg production."

PATEL, T. B. & RODDA, S. T. **Use of D.D.T. as a Plague Control Measure in the Bombay State.** *Indian Med. Gaz.* 1952, May, v. 87, No. 5, 217–21.

The authors supply strong presumptive evidence of the efficacy of residual spraying with DDT as a method of controlling epidemics of plague.

Three different methods were adopted in dealing with villages already infected with plague; these were: I. Spraying all houses with a watery suspension or oil solution of DDT at the rate of 65–75 mgm. per square foot. II. In addition to the above, dusting all burrows in the village with 10 per cent. DDT powder, and III. Spraying the infected locality only and dusting all the burrows in the village. The chief findings in the villages are shown in the Table.

Method employed	Villages treated	Total population	Cases before treatment	Cases in next 3 days	Cases in days 4–10	Cases after 10 days
I	81	71,053	588	45	19	9
II	18	14,348	91	7	2	0
III	7	24,642	77	2	2	2

In 27 villages in which no cases had occurred but dead rats were found method I was adopted and no human infection followed. In the few cases in which

attacks continued to occur after 10 days one of the authors found such flaws as insufficient dosage with DDT or the application by the villagers of cow dung to the walls and floors within two or three days of the spraying.

The flea index was observed before and after spraying in 8 of the villages treated by method I. The average reduction was from about 6·4 to 1·1 of observations made 7–30 days after spraying. In 5 villages treated by method II the average reduction was from 3·9 to 0·4.

Rat destruction was not considered necessary or even advisable. The residual spray was considered adequate by itself though the authors' own findings and general considerations suggest that the combination of residual spraying of houses and dusting the burrows may give added protection.

John W. D. Megaw

CHOLERA

KAUFFMANN, F. **On the Serology of the** *Vibrio cholerae*. *Acta Path. et Microb. Scandinavica*. 1950, v. 27, No. 2, 283–99. [17 refs.]

A fresh study of the antigenic structure of *V. cholerae* was undertaken in view of the findings reported by BURROWS and his collaborators and by GALLUT [this *Bulletin*, 1947, v. 44, 422 ; 1949, v. 46, 631] on the existence of a number of new serological forms of the vibrio in addition to those ordinarily recognized.

Reference is first made to the nomenclature adopted by previous workers in describing the antigenic structure of the vibrio. Bruce WHITE had confirmed the original formula of Nobechi, *viz.* : Inaba=AX, Hikojima=ABX, and Ogawa=BX. Burrows *et al.* and Gallut had also confirmed this structure but had altered the designations to Inaba=AC, Hikojima=ABC and Ogawa=AB. The formulae are, however, in keeping with those of Bruce White and this nomenclature was used in the study.

In the course of their work which established the three forms in their O group No. 1, GARDNER and VENKATRAMAN did not complete the investigations on the Hikojima form by absorption tests and they considered that the character of the type was at the time uncertain. The author, in examining Hikojima strains, found that Hikojima sera were regularly completely absorbed by Ogawa strains and that the C agglutinin which should have been left was lacking. The explanation of this which is suggested is that—" Most likely, the Hikojima strains contain only a small amount of C antigen, as in pure C serum (Inaba serum absorbed by an Ogawa strain) they react considerably more weakly than do the Inaba cultures. It is easy to understand, therefore, that the sera produced with Hikojima strains contain but a scanty amount of C agglutinin. Furthermore, probably the Ogawa strains contain also some C antigen, making them able completely to absorb a Hikojima serum. On the other hand, the small amount of C antigen is not sufficient completely to empty an Inaba serum, whereas the Hikojima strains, which contain more C antigen, are able on massive absorption to empty such a serum completely."

It was found that Ogawa strains grown at 20°C. will absorb an Inaba strain completely or almost completely. It appears that, at 20°C. the B antigen of the Ogawa strain develops poorly and for that reason the development or the " disponibility " of the C antigen is not inhibited by the B antigen. The inability of an Ogawa culture to remove the C agglutinin from the Inaba serum which it will remove from a Hikojima serum, is considered to be due to quantitative conditions.

The author considers that the differentiation between Ogawa and Hikojima strains should be given up and only two types distinguished, *viz.* : Inaba and Ogawa-Hikojima (or, briefly, Ogawa). The formulae would then be :

Inaba=AC

Ogawa-Hikojima=AB(C)

The parenthesized C antigen would indicate that this antigen is not always fully developed or " disponible ". In cross-absorption tests Ogawa and Hikojima strains were found to be identical.

The Inaba and Ogawa-Hikojima strains can be differentiated by the use of a single serum, namely a B serum prepared by absorbing an Ogawa or a Hikojima serum with an Inaba strain, and the formulae of the types could be simplified by designating the Inaba type as A and the Ogawa-Hikojima type as AB. This simplified form which was employed by SCHOLTENS and by HEIBERG may be taken as correct and would not be in conflict with those of NOBECHI and Bruce White.

The question of the validity of the new sub-types within O group No. 1 which had been set up by Burrows *et al.* and confirmed by Gallut was investigated by the examination of 41 strains supplied by Gallut. Of these 36 were found to belong to O group No. 1 and the remainder were not cholera vibrios, two of them being *Escherichia* strains. Of the 36, 23 were Inaba, 11 Ogawa-Hikojima and 2 were somewhat rough and could not be typed with certainty. The antigens D to M which had been defined by Burrows *et al.* and by Gallut as characterizing new serological forms could not be demonstrated in any instance. Seventeen strains isolated in Egypt during the cholera epidemic of 1947 were all found to be identical with the Inaba form, while Gallut had classified them in 12 different serotypes. " The occurrence of new subtypes in the sense advocated by Burrows and by Gallut could not be confirmed and hence they are not taken into consideration in the diagnosis of cholera."

The author points out possible technical sources of error in the serological examination of the vibrios. If cultures are grown on unsuitable media such as hard, thin, too dry agar plates the decisive antigen may develop insufficiently. " Such cultures will then react in all sorts of sera as the overlapping somatic antigens—which normally are concealed under optimal development of O antigens—in this way are disclosed." Sera prepared from such cultures may have a marked content of unspecific agglutinins. Granular agglutination also may, in some cases, be due to R or Q agglutinins. For diagnosis of *V. cholerae* the use of a polyvalent serum prepared by immunizing rabbits with both Inaba and Ogawa strains is recommended. All freshly isolated strains should also be submitted to examination for their biochemical characters and for their capacity for haemolysis. For prophylaxis a polyvalent vaccine prepared from both Inaba and Ogawa strains is advocated : the O sub-types set up by Burrows and his collaborators and by Gallut should not be taken into account in vaccine production.

The author supports the conclusion of Shrivastava and Bruce White that " The existing classification of the vibrios of O group I into serological types is taxonomically invalid ". The Inaba and Ogawa-Hikojima strains merely involve different O forms of one type. *J. Taylor*

SAHA, H. & DAS, A. **Observations on the Nature of Cholera Stools.** *J. Indian Med. Ass.* 1952, Aug., v. 21, No. 11, 464-7.

The examination of a series of cholera stools gave the following average figures for their composition :—

Specific gravity—1,010 ; sediment—9·8 per cent. ; reaction—*p*H 7·86 ; total protein—0·26 gm. per cent. ; sodium—286·2 mgm. per 100 ml. ; potassium—

74·6 mgm. per 100 ml. ; chlorine ion—268 mgm. per cent. ; inorganic phosphate as PO_4—3·6 mgm. per cent. ; bicarbonate—68·2 ml. of CO_2 per cent.

Estimation of enzyme content in 8 samples showed the following activities :—

Tryptic—not detectable ; peptidase—slight ; amylase—marked ; invertase—marked ; maltase—moderate ; lactase—in one sample only ; phosphatase—marked.

Evans blue could not be detected in stools when examined one to two hours after intravenous injection, but thiocyanate was found in every specimen although at somewhat less concentration than in the blood. From the results of the examination it is concluded that the fluid part of the stool has physical and chemical characters resembling that of plasma minus its protein. The fluid is of the nature of a transudate, the intestinal mucous membrane serving as a semi-permeable membrane. *J. Taylor*

De, S. N., Sengupta, K. P. & Chanda, N. N. **Haemoglobinuria in a Case of Cholera.** *Brit. Med. J.* 1952, July 5, 22–4. [23 refs.]

A case of cholera is described in which there were haemoglobinuria, haemoglobinaemia and hyperbilirubinaemia, with albumin and red blood cells and casts in the urine. A typical strain of *V. cholerae* of the Ogawa type which was isolated from the stools showed no evidence of haemolytic activity against sheep or human erythrocytes in 8- or 72-hour culture.

The possible causes of the haemolysis are discussed. It is considered that it could not be due to acidosis or dehydration or to fragility of the erythrocytes : blackwater fever and the action of sulphonamides were eliminated as possible factors. Certain previous observations are cited on the production of a true haemolysin by *V. cholerae* although this is not demonstrable by the tests ordinarily employed, and it is suggested an endohaemolysin may be liberated from the vibrio and absorbed into the circulation, producing intravascular haemolysis. *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Maroc Méd. 1952, May, v. 31, No. 324, 411–60, 11 figs. [Numerous refs.] Communications sur l'Amibiase présentées aux " Journées Médicales " de Fez les 6 et 7 Avril 1952. [18 papers.] [**Amoebiasis : Papers Communicated at a Conference in Fez**]

A two-day medical meeting, the subject of which was amoebiasis, was held at Fez, Morocco, during April 1952. Some 15 of the 20 papers were directly concerned with amoebiasis, and were contributed by local practitioners of medicine, both French and Moroccan, and the matters discussed ranged widely over many of the aspects of amoebiasis as it is encountered locally. It is impossible in a review of this nature to deal with all the subjects discussed, and much less so to refer individually to the many participants in the discussions. Nevertheless, some points of wider interest emerge. Emetine was accepted as the drug of choice in amoebiasis ; and its use intravenously, in the absence of heart disease, was favoured. The gravity of the undesirable side-effects of conessine on the higher nerve centres, despite adjuvant treatment, was recognized. A statement was made that European immigrants into Morocco who acquire amoebiasis usually do so within two months of their arrival, and that women are more prone to acquire it than are men.

Carbohydrate is considered to be an essential food constituent for amoebae in culture. A diet rich in protein and fats causes the recession or disappearance of the parasites from the intestine of experimental animals. One contributor observed that amoebiasis is rarely seen in diabetics, and the development of diabetes caused its remission. On the other hand native Moroccans, among whom amoebiasis is not a serious problem, use barley as a staple of diet, and other contributors considered the barley diet to be a factor in their relative immunity to it. Yet again, this restricted dietary produces the kwashiorkor syndrome of protein deficiency in newly-weaned infants. Amoebiasis, it is stated, is relatively prevalent in such infants, though it is encountered chiefly as a bowel infection and only rarely does it involve the liver. Aureomycin has proved valuable in its eradication from children. *A. R. D. Adams*

Morton, T. C., Stamm, W. P. & Seidelin, R. **Indigenous Amoebiasis : a Recent Outbreak in England.** *Brit. Med. J.* 1952, July 19, 114–16, 1 diagram. [11 refs.]

Sporadic autochthonous cases of amoebic dysentery are from time to time reported in Britain. The authors now record a small epidemic in an R.A.F. station in this country in 1950. A population of 1,042 persons in this station drank grossly polluted water from a bore-hole which descended 120 feet into a chalky layer ; a defective camp sewer was found to run within 20 feet of the bore-hole. In August and September 1950, 141 persons developed acute gastro-enteritis ; of these 6 subsequently suffered from acute amoebic dysentery and 11 from active amoebiasis. Five of the patients with amoebic dysentery had never been out of the country. A search of the stools of all those on the camp at the time revealed the presence of 26 symptomless carriers of *Entamoeba histolytica*. Of a control group consisting of 169 men who later were brought to the camp, 6 were found to be cyst-passers.

The infection was thought to originate from some of the relatively large numbers of persons from overseas. The possibility of similar outbreaks, and the difficulties in their detection, should be borne in mind.

A. R. D. Adams

Chieffi, G. & Basso, M. Indagine sulla diffusione delle parassitosi intestinali : osservazioni in una collettività militare. [**Study of Intestinal Parasitic Infections among Military Groups**] *Acta Med. Italica.* 1951, Dec., v. 6, No. 12, 344–8.

The English summary appended to the paper is as follows :—

" The authors have realized an investigation on the diffusion of intestinal parasitosis in a group of 994 military personnel, belonging to the various regions of Italy. The diffusion is more accentuated between the people belonging to Southern and Insular Italy (29·9%), than between those belonging to Central (25·1%) and Northern Italy (25·0%).

" Between the various parasitosis, amoebiasis, whose regional distribution could not be statistically evaluated, has an index of frequency of 1·7%, which is 1800 times higher than the number quoted by the most recent official statistics ; lambliasis show an index of frequency of 4·4% ; ankylostomiasis was found in 0·4% of the cases.

" The numbers are relative to military population, and therefore they are surely lower than the incidence of the infested cases in the civilian population.

" It is again stressed the necessity of accurate investigations on the diffusion of intestinal parasitosis and, particularly, of amoebiasis ; it is also emphasized

that the investigations must be made, following a correct statistical-epidemiological criterion."

BLANC, F., TOUZIN, R. & VILLA, T. La sédimentation globulaire dans l'amibiase. [**Blood Sedimentation in Amoebiasis**] *Méd. Trop.* Marseilles. 1952, Jan.–Feb. & Mar.–Apr., v. 12, Nos. 1 & 2, 5–65 ; 121–57, 44 charts & 3 figs.

This lengthy paper, which is published in two parts, is concerned with the red-cell sedimentation rate in amoebiasis. This subject has been almost entirely ignored in the literature on amoebiasis, but what references there are to it in the published works suggest that there is a direct relationship between the sedimentation rate and the severity of the amoebiasis, especially in hepatic amoebiasis. The authors have now undertaken an extensive and systematic investigation of the matter. After consideration of the pathology and of the classification of the various types of amoebic infection they record their findings during 18 months' work on 325 patients suffering from amoebiasis ; 250 of them had amoebic colitis and 75 had hepatic amoebiasis. Details are given at length of the investigation of selected patients suffering from representative forms of infection, and the value of the blood sedimentation rate in the diagnosis, prognosis and treatment of amoebiasis is considered.

The authors conclude that an increase in the blood sedimentation rate in amoebiasis is associated with liver necrosis, and that it is a faithful reflection of this. Even extensive ulceration of the colon does not cause a rise in the blood sedimentation rate. The explanation of this is that soluble substances produced by the cytolytic action of the amoebae in the liver are absorbed from the enclosed lesions. These cause physico-chemical changes in the blood plasma, and so an increase in the sedimentation rate. In the case of intestinal amoebic lesions there is no absorption of such substances as the lesions are open and are not enclosed ; thus no such changes occur in the plasma.

After successful specific treatment, with destruction of the amoebae, in patients with multiple small focal lesions of the liver, repair of the lesions is rapid and the sedimentation rate speedily returns to normal. But where there is massive necrosis with extensive abscess formation the process of repair is protracted, and the return of the sedimentation rate to normal is equally slow.

The sedimentation rate therefore affords most valuable information in amoebiasis in assessing the degree of liver damage. It is helpful when a diagnosis is being made ; and it is equally helpful during treatment in determining the progress of recovery from damage to the liver. Where surgical drainage has been done it will show whether this has been thorough and effective, or whether there remain necrotic areas unreached by the surgeon. It also will influence the selection of the drugs to be used during treatment ; it will show whether drugs are needed to attack amoebae in the tissues, or whether contact amoebicides alone are sufficient. The test should therefore be used in amoebiasis as regularly as it is used in such diseases as tuberculosis, acute rheumatism and other conditions in which it is systematically employed. *A. R. D. Adams*

CASALA, A. M. Manifestaciones dermatologicas amibianas. [**Cutaneous Manifestations in Amoebiasis**] *Archivos Argentinos de Dermat.* 1952, July, v. 2, No. 3, 181–209, 3 figs. [83 refs.] French & German summaries.

[We have translated the title as " in amoebiasis " and not " of " or " due to amoebiasis ", because, though the skin lesions cleared under anti-amoebic and local treatment, some of the conditions might be regarded as associated with rather than actually due to the amoebic infection.]

The author divides amoebic dermatoses into two main groups : 1. Cutaneous amoebiasis *sensu stricto*, where the amoeba can be demonstrated in the lesions. 2. Dermatoses with some associated intestinal amoebic infection, the condition being due to allergy or some other cause, the amoeba not being present in the local cutaneous lesion. He gives a brief preliminary history, dividing it into the time prior to 1938 when there were described cases of amoebic dermatitis, and that from 1938 onwards when dermatoses were described as result of chronic intestinal amoebiasis. A very detailed classification and subdivision of the two main groups is presented in a table. The first group, cutaneous amoebiasis properly so called, is subdivided into those caused by contiguity—progressive amoebic ulceration of the skin, and anal and genital amoebiasis. The second large group is denominated " indirect manifestations " and is further subdivided into allergic (21 in number including eczemas, urticaria, prurigo and other such conditions), seborrhoeic complications, acne and rosacea, microbic conditions such as furunculosis, folliculitis, intertrigo (7 such are mentioned) and a varied list including pellagra, herpes, dermatitis exfoliativa (15 are named). Altogether 52 forms are mentioned, in fact almost any skin condition occurring in a patient harbouring an amoeba. The morbid histology of the two main groups is given. With the first—cutaneous amoebiasis—readers of this *Bulletin* are familiar. In the second there is nothing characteristic to distinguish those associated with intestinal amoebiasis from those occurring in ordinary circumstances.

There follows a clinical account of the two groups in general terms. The characteristics of the first are an ulcer rapidly extending, but not uniformly, so that the border may be (and usually is) very irregular, undermined and exuding pus containing the amoeba, a reddish halo external to this paling off to healthy tissue bathed in pus, with partial cicatrization. In the second group, the symptoms are, as would be expected, very varied, many of them nervous and psychic, headache, depression, cardiac and other neuroses, paraesthesias, insomnia and disturbed sleep, but associated with the presence of amoebae in the faeces.

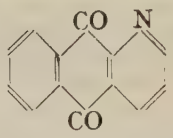
Treatment comprises attention to eight points : (i) Correct parasitological diagnosis ; (ii) Preliminary treatment of concomitant conditions such as septic teeth, infected tonsils, enlarged prostate, etc. ; (iii) Appropriate treatment for the species of amoeba found in the faeces ; (iv) Use of combined treatment ; (v) To bear in mind any superadded microbial or parasitic infection ; (vi) Appropriate regimen for the intestinal or hepatic state ; (vii) To be on the look-out for any toxic effect of the drugs used ; finally, (viii) To guard against re-infection. Various drugs are mentioned : emetine, arsenical oxyquinoline, aralen, and the antibiotics.

Finally, brief details of 17 patients are given, with the faecal findings, the laboratory examinations, the treatment adopted and the resulting progress. Among the 17 there were 7 in whose faeces *E. histolytica* was found alone [recorded as 6 in the author's summary] ; *E. coli* alone in 4 ; *Endolimax nana* alone in 1 ; *E. coli* and *Blastocystis hominis* in 3 ; *E. nana* and *Blastocystis* in 1 ; *E. coli*, *E. nana* and *Blastocystis* in 1. Improvement after treatment of the amoebic infection was rapid and, if relapse occurred, renewal of the treatment promptly gave relief. *H. Harold Scott*

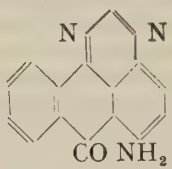
Jones, W. R., Landquist, J. K. & Senior, N. **Synthetic Amoebicides : Part I. Anthrapyrimidines.** *Brit. J. Pharmacol. & Chemotherapy.* 1952, Sept., v. 7, No. 3, 486–93.

The authors have tested a wide range of empirically selected synthetic compounds for anti-amoebic activity by the methods of Jones [this *Bulletin*, 1947,

v. 44, 313], in the hope that a lead might be given for the synthesis of new and efficient substances. There was little correlation of results obtained in *in vitro* and *in vivo* tests, but the moderate activity of 1-azanthraquinone (Ref. No. 1916)



in vitro and *in vivo* led to the selection of other anthraquinone derivatives for test, and 6-aminoanthrapyrimidine (Ref. No. 3074)



proved slightly active *in vitro* and much more so *in vivo*. When administered orally to rats in suspension, the LD50 for a single dose was greater than 1,000 mgm. per kilo. and cure of rats infected with *E. histolytica* could be effected in a dosage of 30 mgm. per kilo. given twice daily for 2 days after infection. The treated animals, however, became photosensitive on exposure to sun and swelling of snout and ears was followed by necrosis of the latter. Some related compounds were also active but proved equally phototoxic. A more detailed study of 3074 showed that its rectal administration to cats was ineffective, but on receiving oral doses of 200 to 500 mgm. per kilo. daily 2 of 3 cats were cured of *E. histolytica* infection, whereas naturally infected monkeys were not. The drug proved quite ineffective in the treatment of 7 persons with *E. histolytica* infection, although toxic effects were not observed with a total dosage of 150 mgm. per kilo. From this study it appeared that only derivatives of 2- or 6-amino-anthrapyrimidines were active, and in general the activity was lost on the introduction of substituent groups. It has been shown that 3074 is rapidly absorbed and the concentration in blood could be measured. It appears to be largely metabolized with appearance of a conjugated leuco form in the urine, while the unaltered drug appeared in urine and faeces. The mode of action of 3074 is not yet clear, but it appears to have remarkable healing powers for rat and cat tissues, and clinical improvement in the animal was often noted before amoebae had disappeared. Considerable data on the anti-amoebic action of related compounds are given in tables. *J. D. Fulton*

Elsdon-Dew, R., Armstrong, T. G. & Wilmot, A. J. **Antibiotics and Amoebic Dysentery.** *Lancet*. 1952, July 19, 104–9, 1 fig. [35 refs.]

A suitable concomitant bacterial infection is held by many workers to be necessary for "aggressiveness" on the part of *Entamoeba histolytica*. It has been shown by other workers that antibacterial treatment alone may arrest the destructive activities of the amoebae. Of the antibiotics, penicillin, aureomycin, bacitracin, terramycin, neomycin, and chloramphenicol, to varying degrees, have at various times proved efficacious in controlling or eradicating intestinal infections with this parasite. The authors, with a wealth of cases of amoebic dysentery at their disposal in Durban, have attempted to assess statistically the results of treatment of the condition with procaine penicillin, procaine penicillin plus succinyl sulphathiazole, phthalyl sulphacetamide,

streptomycin, aureomycin both orally and intravenously, terramycin, chloramphenicol, neomycin, bacitracin, and bacitracin plus neomycin. The data relative to each drug or combination of drugs are set out in the text in a series of small tables. Of them all aureomycin by mouth, terramycin, and a combination of penicillin and succinyl sulphathiazole proved the most effective in producing a high apparent immediate cure-rate, but relapses were usual. The recognized amoebicidal drugs should therefore be given with them to get a high level of sterilization of the infection. While the action of the antibiotics may in part be directly on the amoeba, their major effect is probably on the associated organisms necessary to the amoebae. As the bacterial symbionts are very varied in type, "wide-spectrum" antibiotics are likely to prove more effective in treatment than those exercising their action over a restricted field of bacteria.

A. R. D. Adams

Anderson, H. H., Hrenoff, A. K., Anderson, Jeanette Van D., Nakamura, M. & Contopoulos, A. N. **Fumagillin in Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 552–8.

Fumagillin, a crystalline substance of unknown constitution isolated from *Aspergillus fumigatus* with only slight antibacterial or antifungal activity, was shown to have marked activity against *E. histolytica* both *in vitro* and *in vivo* [this *Bulletin*, 1951, v. 48, 640, 992]. Its influence on chronic amoebiasis of man and monkeys has now been investigated. When a dosage of 250 to 625 mgm. per kgm. was given to monkeys during a period of 5 to 10 days which were examined over a follow-up period of 3 months, 12 out of 19 were free from *E. histolytica* but the effect on other intestinal parasites was irregular. On the basis of the results obtained in monkeys, tolerance studies were made on 20 human subjects and a dosage of 50 to 100 mgm. over 12½ days proved innocuous. With the larger dose 9 of 10 cyst-passers remained free of amoebae for 3 months, while the smaller dose proved effective in 4 of 10 patients. The value of the drug in acute amoebiasis or in hepatic infections was not determined, but the use of fumagillin in chronic and drug-refractory intestinal amoebiasis appears to be justified.

J. D. Fulton

Jones, Myrna F. **Studies on Treatment of Fresh Vegetables contaminated with Cysts of *Endamoeba histolytica*. I. Acetic Acid.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 576–84.

The danger of spreading amoebic infection by means of foodstuffs is well recognized and this investigation is concerned with the means of prevention in the case of fresh vegetables. The cysticidal effect of acetic acid had previously been demonstrated by Beaver and Deschamps [this *Bulletin*, 1949, v. 46, 830], and the action of this substance on cysts of *E. histolytica* has now been studied in more detail with regard to temperature, concentration and duration of treatment. For this purpose, cysts obtained from culture by centrifugation and washing were used to contaminate a wide variety of leafy vegetables. Studies were first made on cysts alone which were added to acid of the desired strength to give a final concentration of approximately 2,000 cysts per ml. The effect of this substance at various concentrations, times of exposure and temperatures was determined by inoculation of culture tubes, containing a suitable bacterial flora, with varying numbers of cysts recovered after chilling and neutralization of acid with sodium bicarbonate. Vegetables previously contaminated with known numbers of cysts were similarly treated. The experimental temperatures varied between 25 and 50°C., and the concentrations of acetic acid used were

1, 2·5 and 5 per cent. With cysts alone in absence of vegetable material 15 minutes' exposure to 5 per cent. acetic acid at 30°C. was lethal, and likewise 5 minutes at 45°C. with 2·5 per cent. acid. Comparable results were obtained with vinegar at the higher temperature (concentration of acetic acid 4 to 5 per cent.). With contaminated lettuce a few viable cysts remained after exposure to 5 per cent. acid for 15 minutes at 30°C. and also after exposure to 2·5 per cent. acid for 5 minutes at 45°C. The treatment with acetic acid caused deterioration in the quality of vegetables which necessitated using them after only short periods of storage, and the protection afforded against *E. histolytica* cysts was, moreover, not complete. *J. D. Fulton*

TAYLOR, D. Jane, GREENBERG, J. & JOSEPHSON, E. S. **The Effect of Two Different Diets on Experimental Amebiasis in the Guinea Pig and in the Rat.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 559–66. [26 refs.]

There is considerable evidence that diet influences the course of infection with *E. histolytica* in experimental animals. Studies in this field have previously been reported by the present authors [this *Bulletin*, 1951, v. 48, 639]. With the object of finding a diet which would give the heaviest infection with *E. histolytica* in rats and guineapigs for use in drug-screening tests, the effect of two other diets on this infection have been studied. For this purpose guineapigs 10 to 21 days old, weighing 85 to 250 gm., housed in single cages, were used and groups of 10 with suitable control groups received the diets, which are described in detail. After intracaecal inoculation by the method outlined earlier, the caecum of each animal was carefully examined, at death or on being killed, for the presence of amoebae and the characters of the lesions were noted. The rats used weighed 30 to 104 gm. ; the method of inoculation and of assessing results was essentially that of JONES [*ibid.*, 1947, v. 44, 313]. In agreement with the results obtained by other authors it was concluded that diet had a definite influence on infections with *E. histolytica* in the gut of both hosts. Whereas one diet increased the percentage of infections in both animals, the other favoured that in the rat but had the opposite effect in the guineapig. *J. D. Fulton*

SWARTZWELDER, J. C. & AVANT, W. H. **Immunity to Amebic Infection in Dogs.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 567–75. [10 refs.]

In an earlier investigation on the immunology of amoebiasis Swartzwelder *et al.* described the resistance to infection with *E. histolytica* produced in rats previously treated with extracts of the parasite [this *Bulletin*, 1950, v. 47, 749]. They now report on the acquired immunity to reinfection in dogs with a homologous and a heterologous strain of *E. histolytica* following cure of a previous infection with this parasite. Tests were also made for the presence of immune bodies in the blood of cured animals by transfusion experiments. Animals of either sex aged a year or more were used after examination to establish that natural infections were absent. The animals were then inoculated by rectal intubation with infective material from donor dogs, or by using trophozoites from culture. The infection was allowed to terminate spontaneously or cure was effected by the use of chemotherapeutic agents, as determined by repeated stool examinations and the use of the canned salmon diet described by FAUST [this *Bulletin*, 1935, v. 32, 777] which is reported to cause an exacerbation of latent infection. Reinfection was then attempted on two or more occasions as described above with a homologous or heterologous strain of *E. histolytica*. If infection was then not apparent the animals were killed and examined as a

final proof of a refractory state. On first inoculation, 39 of 46 dogs became infected and 29 of these animals were challenged on several occasions with further inocula of the homologous parasite following cure, but only 5 developed infection : 23 out of 24 of the refractory animals were further challenged with a heterologous strain, but in no case was infection established over a period of 10 weeks to 9½ months. The duration of the original infection and the method of terminating it did not affect the degree of resistance to reinfection. On transfusing 10 fresh dogs with 50 to 100 ml. blood of refractory animals prior to inoculation a lower infection rate resulted. *J. D. Fulton*

Basnuevo, J. G. *Balantidium coli* y Hexilresorcinol (Santokín). [*Balantidium coli* **Infection treated with Hexylresorcinol (Santokín)**] *Rev. Kuba Med. Trop. y Parasit.* 1951, July–Aug., v. 7, Nos. 7/8, 96–7. English summary (3 lines).

The author, alone or with his colleagues, has previously recorded good results from the use of enemata of hexylresorcinol in helminthiasis [see this *Bulletin*, 1951, v. 48, 1137 ; 1952, v. 49, 293, 429, 639]. He has now used the same method, or one closely similar, for balantidiasis.

In the two cases recorded in this paper, after a course of 3 enemata, repeated examination of the stools failed to detect any Balantidia. He rightly observes that more cases must be observed and for a longer time before definite conclusions can be drawn as to the efficacy of the treatment. The drug is used in a strength of 1 in 300, or 2 gm. in an enema of 600 cc. The compositions of the enemata are as follows :—

No. 1. Hexylresorcinol 2 gm., gum acacia 60 gm., warm water 600 cc.

No. 2. Hexylresorcinol 2 gm., acacia 60 gm., kaolin 12 gm., warm water 600 cc. and the same for the 3rd enema in one patient, aged 7 years, the enemata being administered at 5-day intervals.

The second patient, a child of 8 years, received the first enema as in the previous case. No. 2 consisted of hexylresorcinol 2 gm., acacia 60 gm., barium sulphate 30 gm., warm water 600 cc., and No. 3 of hexylresorcinol and acacia as before, but with colloidal aluminium hydrate 15 gm. and kaolin 15 gm., in warm water 600 cc. and the intervals were 7 days in place of 5 days. The mode of preparation for, and administration of, the enemata has already been given in this *Bulletin* [see above references]. In previous accounts 15 cc. per lb. body weight were given ; in the present paper 20 cc. is recommended for children up to 60 lb. and for adults 1,200–1,500 cc. If any of the enemata fails to reach the caecum more than three may be needed.

The mode of preparation of the enemata is detailed. Though warm water may be used, the author prefers 10 per cent. acacia emulsion for the following reasons : it has the characteristics of a colloid suspension ; it is more easily retained in the bowel ; it protects the mucosa against the irritation (though this is slight) of the hexylresorcinol, and, by adhering to the mucosa, it enhances the parasiticidal action of the drug. *H. Harold Scott*

Nushan, H. & Miller, B. **Ameboma of the Transverse Colon.** *Ann. Intern. Med.* 1952, Aug., v. 37, No. 2, 372–9, 3 figs. [25 refs.]

Report of a case.

Burrows, R. B. & Jahnes, W. G., Jr. **The Effect of Aureomycin on Balantidiasis.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 626–30. [18 refs.]

The treatment of balantidiasis is still on an unsatisfactory basis and various types of compounds, including halogenated oxy-quinolines, emetine, arsenicals,

sulphonamides and antibiotics have been suggested for use. The authors describe the treatment of 6 patients suffering from this infection with aureomycin, whose activity and that of terramycin have been described [this *Bulletin*, 1951, v. 48, 156, 471, 1114]. Aided by culture methods a very complete examination was made in fresh and stained preparations of faeces for the presence of other parasites. Two patients were given 2 gm. aureomycin daily, total dosage 28 gm. ; 4 others were given slightly smaller total doses of 17 to 22·5 gm. because they complained of nausea and vomiting. *Balantidium coli* disappeared for good in all cases within the first 4 days of treatment, and was not seen in examinations extending over 2 to 12 weeks. *E. histolytica* and *E. coli* infections were also terminated. *J. D. Fulton*

LEPROSY

COCHRANE, R. G. **Leprosy with particular reference to Conditions at Present pertaining in the British Isles.** *Pub. Health.* 1952, Sept., v. 65, No. 12, 197–8.

After referring to the history of leprosy in the British Isles the author discusses the reason why leprosy, after being present for more than 1,000 years, gradually died out and became extinct in 1798. He favours the theory that it " died out in this country because there came a time when it was no longer possible for children to become infected. . . . In consequence of this, although the number of cases in this country may have doubled, and perhaps trebled, in the last 30 years, of all the cases recently reported no case has been traced to an infection from a patient with leprosy in Britain." The method of transmission of infection is then discussed briefly.

The author calculates that there are at present in England and Wales some 150 cases, in all of which the disease has been acquired outside the country. About 50 per cent. of these are Anglo-Indians and others who have migrated to Britain. " Owing to more rapid communications, the ease of travel, unsettled political and economic conditions, the number of persons seeking asylum in this country from European, Asiatic and African countries, where leprosy is endemic, must consequently be greater than ever." It is not beyond the bounds of possibility that the number may reach 300 in the next few years. To the objection " But such people have no business entering this country " the answer is : " It is not so easy to detect leprosy as it is to discover smallpox among immigrants. . . . There are three reasons for this difficulty in diagnosis—(1) the patient may be in the silent phase of the disease, and develop leprosy many years after he has entered the country ; (2) the patient may be unaware of his condition. . . . ; (3) even though a patient is aware that he has leprosy he may seek, if a British subject, domicile in this country because of intolerable and harsh rules pertaining in the country from which he comes ".

No measures involving compulsion are likely to succeed, as they would only drive the disease underground and deprive patients of treatment, and lead to much misery. Under the National Health Service Act patients are entitled to treatment, and if necessary to special care. There is now effective treatment, and deformities, if they occur, can to a certain extent be helped by plastic and orthopaedic surgery. Education of the public is necessary to do away with the unreasoning terror that many have of leprosy. Leprosy is one of the diseases with an objectionable social vocabulary attached to it, and words like " leper " should not be used by the medical profession. After a paragraph on modern treatment, reference is made to the Ministry of Health Home near Redhill,

the purpose of which is to make available expert treatment to those who need special attention. Leprosy has now been declared a notifiable disease by the Ministry of Health, but this does not imply that they consider leprosy to be a menace to public health. *Ernest Muir*

SATO, S. **Behavior of Leprosy Bacilli implanted in Various Liquid Media by means of Slide Culture Method.** *Sci. Repts. Res. Insts. Tohoku Univ.* 1951, v. 3, No. 3, 269–73, 1 fig.

This work had as its object testing the claims of certain Japanese workers that they had obtained a limited amount of growth of leprosy bacilli in certain media. The author failed to confirm these findings and suggests that the apparent growth of bacilli was due to the strong tendency of bits of leproma to autolyse, setting free bacillary masses outwards within the media.

Eleven skin lepromas from 7 leprosy patients and 8 skin nodules from experimental rat leprosy were employed. Three sorts of suspensions were so made as to contain (*a*) 10–20 bacilli per field, (*b*) 50–100 per field, (*c*) a vast number per field. Various forms of media were used with the bacillary suspension, such as blood or plasma, egg yolk, chick embryo juice, heart, liver, etc. These were smeared on slides, which after desiccation were placed in test tubes containing various forms of liquid nutrient media. The test tubes were sloped so as to immerse the slides, and were placed in an incubator. The slides were examined microscopically after periods varying from 10 to 90 days.

Although tubercle bacilli grew well when this method was used, no sign of growth of leprosy bacilli could be found. " When suspension of scanty leprosy bacilli was used as an inoculum, judgement whether multiplication of bacilli occurred or not was always easy and clear, whereas in cases of inoculating a rich bacillary suspension holding small pieces of leproma in it, splendid findings could often be obtained microscopically, giving an impression as if the growth of bacilli had really occurred on the slides. However, the scrutinization of the findings in comparison with the corresponding control slides, including a slide inoculated but not incubated in the test-tube, did not confirm the occurrence of even microscopical growth." *Ernest Muir*

NEYRA RAMIREZ, J. Las correlaciones inmunológicas de la lepra con la tuberculosis. Su aplicacion practica : la vacunacion BCG en la profilaxis de la lepra. [**The Immunological Correlation of Leprosy and Tuberculosis. Its Practical Application. Vaccination with BCG in the Prophylaxis of Leprosy**] *Temas de Leprologia.* 1952, Mar., v. 7, No. 23, 1–31. [80 refs.]

The author interprets the early response to the lepromin test, associated with the name of Fernández, with hypersensibility ; and the late response (Mitsuda test), after 30 days or more, with an expression of immunity. An immunological correlation between leprosy and tuberculosis is claimed. Leprosy, or at least the lepromatous type, depresses the tuberculin reaction ; in 22 lepromatous cases only 77·22 per cent. gave positive Mantoux tests with a dilution of 1 in 10, which is fewer than in the general population of the same age-groups. Tuberculous infection has an important function in sensitizing to the lepromin test : in 100 cases of tuberculosis in a zone where leprosy was not endemic the author found 45 per cent. of Fernández-positives and 56 per cent. of Mitsuda-positives, as compared with only 15 per cent. positives in 100 healthy persons in the same zone. In 53 healthy, lepromin- and tuberculin-negative subjects, vaccination with BCG produced 81·13 per cent. of lepromin-positives (both early and late). It is proposed to turn the results of these experiments to practical use in the

campaign against leprosy in Peru by using BCG vaccination in the regions where leprosy is endemic, and particularly in three groups of people : children in contact with leprosy, healthy persons in contact with patients, residents in endemic areas who cannot withdraw from the focus of infection. This immunization is to be preceded by popular education in this subject. It is proposed also to study the Mitsuda test in cases of tuberculosis to see if it has any prognostic significance. It is considered to be of national interest, both practical and scientific, to study lepromin and tuberculin reactions in remote areas where the aboriginal inhabitants have so far been exempt from both diseases.

Ernest Muir

Neyra Ramirez, J. & Pesce, H. Estudio en 288 casos de las correlaciones inmunologicas lepra-tuberculosis. El viraje de la lepromino-reaccion con BCG y su aplicacion a la profilaxis de la lepra. [**The Study in 288 Cases of the Immunological Correlation between Leprosy and Tuberculosis. The Shift of the Lepromin Reaction with BCG, and its Application in the Prophylaxis of Leprosy**] *Temas de Leprologia.* 1952, June, v. 7, No. 24, 1–8.

The following experiments and their results are recounted. In a zone which is endemic to tuberculosis 25 cases of leprosy showed 77 per cent. of tuberculin-positives, as compared with 92 per cent. in the healthy population : it is concluded that malignant leprosy depresses resistance to tuberculosis. In a region non-endemic to leprosy, 56 per cent. of 100 cases of tuberculosis with positive tuberculin tests showed positive lepromins (Mitsuda), as compared with only 15 per cent. among healthy people in the same area ; this indicates common sensitization to the two diseases. In the latter experiment the lepromin reactions were stronger in tuberculin-positive adults under treatment for tuberculosis and in good condition, and also in tuberculin-positive children with early tuberculosis. This strengthens the presumption that early tuberculosis exercises a defensive rôle against leprosy, and that Mitsuda's test might be used in tuberculosis in determining the prognosis. In 100 tuberculin-negative healthy subjects only 15 per cent. were lepromin-positive, as compared with 45 per cent. (Fernández) among those with tuberculosis ; this strong difference is taken as a further indication of the influence of the tubercle bacillus on the positivity of the lepromin reaction. In 10 nursing mothers with negative tuberculin tests and not vaccinated with BCG all the lepromin tests were negative.

Ernest Muir

Passos, A. C. de M., Baptista, L., Martins, A. B. C. N., Sampaio, B. P., Silveira, H. & Marques, A. R. O comportamento da reação de Mitsuda em tuberculosos após a becegeização oral. [**The Behaviour of the Mitsuda Reaction in Tuberculosis after Oral BCG**] *Rev. Brasileira Leprologia.* S. Paulo. 1952, Mar., v. 20, No. 1, 1–19, 4 graphs. [45 refs.] English summary.

After reviewing the literature on the effects of BCG in leprosy, the authors describe their own experiment.

Fifty-seven patients with active tuberculosis were chosen and their Mitsuda reactions were tested. Of these (read on the 30th day), 33 patients had a reaction papule of 5 mm. or more, 22 of less than 5 mm. and 2 no reaction at all. The 33 patients with the stronger reaction were used as controls, and to 20 of those with the weaker reactions BCG (0·20 gm. per dose) was given orally, 3 doses at weekly intervals to 15, 2 doses to 3, and 1 dose to 2 patients. Read on the 30th day, the reaction papule was larger than on the previous occasion in 13 (65 per cent.) cases.

Ernest Muir

Guimarães, N. Efeito das substâncias anti-histamínicas sôbre a lepromino-reação. (Tentativa de dissociação das reações precoce e tardia.) [**Effects of Anti-Histaminic Drugs on Lepromin (Mitsuda) Tests**] *Hospital.* Rio de Janeiro. 1951, Nov., v. 40, No. 5, 769–72.

Reference is made to the absence of results when antihistamine drugs have been associated with the tuberculin test. The present experiments were made in order to determine whether the lepromin test was affected by antihistamine drugs, either in the early (Fernández) readings, or in the late (Mitsuda) readings. The two drugs used were Trimeton (Schering) and Neo-Antergan (Rhodia). Seven children from a preventorium and 4 patients from a leprosarium were chosen. The lepromin test was found more or less strongly positive in all, in both early (48 hours) and late (25 days) readings. Then the test was repeated, giving 150 mgm. of Trimeton, or 200 mgm. of Neo-Antergan per day from 8 days before the second test up to the time when the late readings were taken. No significant difference was found between the readings of the first test and those of the second. It is concluded that confirmation is given to the belief that, admitted that the phenomenon of Fernández is of an allergic nature, the allergy must be of the same type as tuberculin allergy. *Ernest Muir*

Azulay, R. D. & de Andrade, L. M. C. Índices de positividade bacterioscópica nos tipos histológicos indeterminado e tuberculóide encontrados na lepra. [**Bacterial Indices in Indeterminate and Tuberculoid Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1952, Mar., v. 20, No. 1, 20–21.

The English summary appended to the paper is as follows :—

" The authors have studied the bacterioscopy of 1,096 biopsies of skin from leper patients of the Indeterminate and Tuberculoid forms.

" The staining of the bacilli was made by Ziehl-Klingmüller and Gram-Weigert in histopathological slides.

" The results were :

Form of leprosy	*Positivity*
Indeterminate	5·2%
Quiescent Tuberculoid	0·37%
Reactional Tuberculoid (typical and borderline) ...	51·1% "

Azulay, R. D. A pesquisa do *Mycobacterium leprae* pelos métodos de Gram-Weigert e Ziehl em córtes histológicos e pelo método de Ziehl-Gabbet em esfregaço. (Estudo comparativo de 355 casos.) [**The Search for** *Mycobacterium leprae* **by the Method of Gram-Weigert and Ziehl in Histological Sections, and by the Method of Ziehl-Gabbet in Smears. (A Comparative Study of 355 Cases)**] *Rev. Braseilira Leprologia.* S. Paulo. 1952, Mar., v. 20, No. 1, 22–5. English summary.

When only one slide of each of the cases was examined by each of the three methods, 39·71 per cent. were found positive by the Gram-Weigert method, 37·74 per cent. by the Ziehl-Klinmüller, 45·35 per cent. by a combination of these two methods, and 40·84 per cent. with the smear (Ziehl-Gabbet) method. The author prefers the combination, as giving the largest number of positives, and as it is possible to examine many sections without recalling the patient. *Ernest Muir*

PORTELLA, O. B. & DE ALMEIDA, J. O. Reações de microfloculação com cardiolipina e sitolipina em soros de leprosos. [**Microflocculation Tests with Cardiolipin and Sitolipin in Leprosy Sera**] *Rev. Brasileira Leprologia.* S. Paulo. 1952, Mar., v. 20, No. 1, 32–40. [28 refs.] English summary.

The microflocculation reaction (VDRL slide test) was tested in 152 sera of lepromatous patients, cardiolipin and sitolipin being used. The results with these two lipins were in concord in scarcely 65 per cent. of cases ; there was slight discord in 27 per cent., and total discord in 8 per cent. With cardiolipin there were 27 per cent. positive, 19 doubtful, and 54 negative, while with sitolipin there were 31·6 per cent. positive, 18·4 doubtful and 50 per cent. negative. The same sera gave only 5 per cent. of positive results with the complement-fixation test of WADSWORTH *et al.* (50 per cent. end-point). The authors consider that false positives are due less to want of specificity of the phospholipids than to the technique employed. *Ernest Muir*

FURNISS, A. L. **Leproma in Female Breast presenting as Carcinoma.** *Indian Med. Gaz.* 1952, July, v. 87, No. 7, 304.

GRABSTALD, H. & SWAN, L. L. **Genitourinary Lesions in Leprosy with special reference to the Problem of Atrophy of the Testes.** *J. Amer. Med. Ass.* 1952, Aug. 2, v. 149, No. 14, 1287–91, 5 figs. [Refs. in footnotes.]

The authors examined 179 male patients in Carville Leprosarium, only the testes and breasts being examined in 154, and more detailed examinations in 25. Gynecomastia was found in 32 (19 per cent.). Of 50 testes measured in 25 patients, 14 (28 per cent.) were atrophied. Atrophy was almost always bilateral. There were no voice changes, except in a patient suspected of having leprous laryngitis. In leprous orchitis there was infiltration of the vessel walls and adjacent tissue with *Myco. leprae*, interstitial cell clumps, and atrophy of seminiferous tubules progressing to complete fibrosis. The fact that the ovaries are not similarly affected is taken to indicate that " inherent physiological characteristics of the gonads or common embryological ancestry of the organs is of no significance ", but " it may be postulated that the environmental temperature difference between testis and ovary may account for this finding ". In general the patients had not classical eunuchoid characteristics. Leprosy is perhaps one of the few diseases associated with hypergonadotropic eunuchoids in which the aetiological factors are known. *Ernest Muir*

KOBAYASHI, S. [**The Disturbance of the Bladderwall-Sensitivity to Temperature in various Types of Leprosy**] *I Ryo* (*Med. J. Nat. Hosps. & Sanatoriums of Japan*). 1952, May, v. 6, No. 5, 313–16. [In Japanese.]

The English summary appended to the paper is as follows :—

" Forty cases of various types of leprosy were examined with regard to sensitivity of their bladder wall to change in temperature.

" (1) Patients whose sensitivity to temperature was disturbed were found in the group of advanced stages of tubercular and neural leprosy.

" (2) Patients who had paraesthesia of the skin or alopecia of the pubic part had also experienced disturbance of their sensitivity to temperature at the bladder wall.

" (3) The disorder of the kidney function is very often related to a disturbance to the sensitivity of the bladder.

" (4) The disturbance to the sensitivity of the bladder is caused by the lepromatous infiltration through the mucous membrane of the bladder wall."

COCHRANE, R. G. **Recent Advances in the Pathology and Treatment of Leprosy, with special reference to their Importance in the Control of the Disease.** *Ceylon Med. J.* (n.s.) 1952, May, v. 1, No. 1, 39–47, 3 figs. on pl.

This is a speech given before the Ceylon Medical Association. It is divided into four sections. The first deals with the histological work of Dr. V. R. KHANOLKAR, [already reviewed in this *Bulletin*, 1952, v. 49, 56]. The second reviews recent advances in treatment, DDS, sulphetrone, diasone and thiosemicarbazone being specially referred to. The third is occupied with the work of Dr. Paul BRAND on the prevention and treatment of paralysis and deformities in leprosy, by means of the use of special splints and exercises, and, in suitable cases, by bringing the tendon of the *flexor digitorum sublimis* into the palm and attaching it to the lumbrical tendon. This and other restorative operations are described in detail. In his fourth section the author applies recent advances to the control and elimination of leprosy in Ceylon. He strongly criticizes the method of isolation so far adopted, which encourages a prison-like environment " and results in dissatisfaction among the patients and avoidance, until the last, of the State's effort to bring the infective case under segregation ". Regarding the application of treatment he says, " This does not mean that segregation is now not necessary. It is still essential. It does, however, mean that a greater degree of laxity can be allowed in permitting infective cases to be treated in out-patient clinics, provided reasonable precautions are taken to prevent the infective case coming into close contact with children (especially night contact). —Sulphone treatment, used properly and intelligently, will increasingly become an essential aid to the Preventive Officer and along with adequate control measures should hasten the day when leprosy is possible of control."

Ernest Muir

MUNGAVIN, J. M. **A Review of the Relative Activity of the Sulphones.** *Leprosy in India.* 1951, July, v. 23, No. 3, 161–4. [18 refs.]

FLOCH, H., LECUILLER, A. & SUREAU, P. Mode d'action des sulfones dans la lèpre (VI). Comment agit la Phényl-prophyl-diamino-diphényl-sulfone (sulfone disubstituée), administrée par la voie buccale. [**Mode of Action of Sulphones in Leprosy (VI). What is the Action of Phenyl-propyl-diamino-diphenyl-sulphone (Disubstituted Sulphone) when administered by Mouth**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 260.* 1952, Apr., 4 pp.

Various conflicting views are mentioned as to the amount of this drug (Cimédone in France and Sulphetrone in England) absorbed when given orally. Given in this way, 3 gm. equals 200 mgm. of DDS. The amount absorbed is very variable, often not more than 50 per cent. *Ernest Muir*

TZANCK, A., BASSET, A. & SALOMON, L. Un cas de lèpre traité par l'association, à poids égal, de deux nouvelles sulfones di-substituées : la diphényl sulfone 4,4′ bis (azo-para-isopropyl-métacrésol) et son dérivé diargentique. [**A Case of Leprosy Treated by Associating in Equal Parts by Weight of Two New Disubstituted Sulphones : Diphenyl Sulphone 4,4′ bis (azo-para-isopropyl-metacresol) and its *bis*-Silver Derivative**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1952, Nos. 22/23, 749–52, 2 figs.

A patient who contracted leprosy in Indo-China was treated with these sulphone derivatives, the dose of the product being 200 mgm. each day. Within 6 months he made great clinical improvement and the drugs produced no toxic

effects. At the beginning of treatment smears from the nasal mucosa and the buttock showed numerous bacilli ; smears from the mucosa 22 months after the beginning of treatment were negative. The authors conclude that J.51 (the name applied to these drugs) is certainly 40 times less toxic than DDS. [It appears rather rash to base such a conclusion on the treatment of only one patient. The type of case is not mentioned, and one may question whether it was not tuberculoid or border-line. No mention is made of the blood concentration for the amount absorbed or the rate of excretion, all very essential points in comparing the toxicity with that of DDS.] *Ernest Muir*

Floch, H. Le traitement sulfoné peut modifier la réponse du test de Mitsuda chez les lépreux indifférenciés. [**Sulphone Treatment is able to Modify the Response to the Mitsuda Test in Uncharacteristic Cases of Leprosy**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 295–300.

Forty-three children suffering from leprosy, 25 of whom were classified as having uncharacteristic and 18 as tuberculoid disease, were examined for their Mitsuda reaction. Of the former, 12 (48 per cent.) were positive. After periods of treatment with sulphone varying from 22 months to 4½ years, 21 (84 per cent.) were found to be Mitsuda positive. Thus 9 of those found Mitsuda-negative in 1949 had become positive in 1951. There was very little change in the reactions of the tuberculoid cases. The conclusion is arrived at that in uncharacteristic leprosy the change of the Mitsuda test from negative to positive under the influence of sulphone therapy testifies to an increase of resistance to the bacillus of Hansen which certainly indicates a favourable prognosis. *Ernest Muir*

Floch, H. Positivation de la lépromino-réaction chez les lépreux indifférenciés traités par les sulfones. [**Making the Lepromin Reaction Positive in Undifferentiated Leprosy by Treatment with Sulphones**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 253.* 1952, Jan., 6 pp.

Of 70 children suffering from the undifferentiated and tuberculoid forms of leprosy, and under treatment with DDS for periods varying from 22 months to 4½ years, 61 per cent. of those with the undifferentiated form, and who were originally lepromin-negative, became lepromin-positive. None of those originally positive became negative. There was very little change in the reactions of the tuberculoid cases. *Ernest Muir*

Floch, H. Les réactions lépreuses sont-elles évitables ? Comment les traiter ? [**Are Lepra Reactions Avoidable? How should they be Treated?**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 254.* 1952, Feb., 7 pp. [11 refs.]

In order to avoid lepra reaction during the early part of treatment with sulphones the author advises using the intramuscular route, at least during the first few months. He also advises the use of vitamin PP [nicotinamide] as it increases tolerance to the various sulphones. Also DDS and succinyl-sulphone may be associated, or DDS and thiosemicarbazone. When reaction actually occurs the dose of sulphone should be reduced, but in the author's opinion it is a pity to suspend treatment unless there is danger from reaction in the eyes. Vitamin D_2 or vitamin C may be given in large doses. In reacting tuberculoid cases the author finds that the reaction is shortened by sulphone treatment. *Ernest Muir*

Floch, H. Conduite à tenir dans les réactions lépreuses. [**Action to be Taken in Lepra Reaction**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 344–50. [12 refs.]

This condition is commonest during the early months of sulphone treatment, and it is advised that during that period the intramuscular route be used instead of the oral, as being less provocative of reaction. Vitamin PP [presumably nicotinic acid] can be used as a preventive, as it increases tolerance to the sulphones. If with the oral route reaction occurs, and change of the route is not sufficient to control it, one may keep the dosage below the reaction threshold, and from time to time test the height of the threshold. The combination of DDS with monosubstituted sulphones or with thiosemicarbazone may be tried. If the reaction is serious, or if the eyes are involved, sulphone treatment must be suspended temporarily. Intravenous Anthiomaline and vitamin PP should be used as adjuvants, and in tuberculoid cases vitamins D_2 or C in large doses.

Ernest Muir

Orbaneja, J. G., Such, M. & Perez, A. G. Resultados del tratamiento de la lepra con tiosemicarbazona. [**Results of Treatment of Leprosy with Thiosemicarbazone**] *Rev. Brasileira Leprologia.* S. Paulo. 1952, Mar., v. 20, No. 1, 41–50.

Details are given of 47 patients treated with 150 to 200 mgm. (starting with 25 to 50 mgm.) of thiosemicarbazone daily for periods varying from over a year to 3 months. Of the 6 who had had treatment for more than a year 5 became bacteriologically negative, but it is confessed that the examinations were made of the mucosa by a method the exactitude of which is only relative. The tolerance of the drug was good in 29 of 56 cases (some treated for less than 3 months). The causes of intolerance were lepra reaction in 13, gastralgia in 7, anorexia in 6, disturbance of vision in 4. Thiosemicarbazone is recommended as active in leprosy infection.

Ernest Muir

Montestruc, E. & Blache, R. Le traitement de la lèpre par le thiosemicarbazone (T.B.1). [**The Treatment of Leprosy with Thiosemicarbazone (T.B.1)**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 3, 300–304.

Six cases were treated with thiosemicarbazone ; 3 of them had been previously treated with sulphones, and 3 were new cases. The conclusions arrived at are : that this drug is perhaps as good as sulphones in skin lesions, but is less effective in lesions of the mucosa ; like the sulphones it is often without action in nerve lesions ; the action on lepra bacilli is less than that of the sulphones, though there is undoubted effect in early cases ; the haemolysis and haemagglutination reactions are similar to those with the sulphones, but get less progressively ; the introduction of this drug is fortunate as it can be used successively or alternatively with sulphones in cases which do not tolerate the latter or have developed drug resistance.

The dose for adults was 100 mgm. daily for 6 days the first week, 150 the second, and 200 the third and following weeks, with an interval of 15 days every month.

Ernest Muir

Secret, E. Essai de traitement de la lèpre par l'Isoniazide. [**Treatment Trial of Leprosy with Isoniazid**] *Maroc Méd.* 1952, June, v. 31, No. 325, 551–3.

Three lepromatous cases were treated with Rimifon, 4 tablets (50 mgm. each) a day. The patients had distressing complications such as nerve pains

and fever. After 4 months of treatment the first two patients treated were much improved clinically. The third patient was treated later and he also had made much improvement within a month. The author considers that the results obtained justify further trial of the hydrazine derivatives of isonicotinic acid. One of the outstanding effects noted was the rapid rarefaction of lepra bacilli in the nose. *Ernest Muir*

HELMINTHIASIS

BATES, B. H. & ALBERTO, V. G. **Routine Stool Examinations : Confirmation of the Value of the Acid-Sulphate Ether Concentration Test.** *South African Med. J.* 1952, Aug. 2, v. 26, No. 31, 621–4, 4 figs.

Dr. Bates and Dr. Alberto of the Government Pathological Laboratory, Durban, undertook an investigation into the value of the acid-sulphate ether concentration test on stool specimens submitted for the presence of ova as compared with the direct method previously employed in that laboratory. To dissolve the stool an acid and sodium sulphate mixture was employed instead of acid alone. A centrifuge with a special head capable of spinning a batch of 24 tubes horizontally was available, each specimen being limited to one centrifugation.

One gm. of stool was comminuted with the acid-sulphate solution, the mixture filtered through at least two layers of surgical gauze and the filtrate then mixed intimately with an equal volume of ether. This was vigorously shaken for about 20 seconds in a corked centrifuge tube resulting in the formation of a deposit at the bottom of the tube. The supernatant ether layer was decanted and by means of a capillary pipette of fairly large bore the deposit was quickly mixed and removed to a slide, covered with a cover-slip and examined very carefully for ova.

In 3 months, 2,081 specimens were tested by this acid-sulphate ether concentration technique and the authors were able to show that cases of intestinal schistosomiasis likely to be missed by the usual direct method of stool examination are less liable to be overlooked by the new technique. Further, many cases of infection with hookworms, *Taenia* spp., *Ascaris lumbricoides* and *Trichuris trichiura* were discovered. In no instance where *T. trichiura* or hookworm ova were found did the concentration test fail to confirm the direct finding, while many additional cases were revealed.

The following table summarizes the results :—

	By direct examination only	By direct and acid-sulphate ether test
	per cent.	per cent.
S. mansoni	0·1	1·0
Hookworm ova	0·6	5·0
Taenia spp.	0·6	1·5
Ascaris lumbricoides	6·0	11·0
Trichuris trichiura	4·0	33·0

The authors suggest that in spite of the extra time and material involved, the acid-sulphate ether method can be recommended as a routine test for the demonstration of ova, especially in endemic regions of schistosomiasis and hookworm, such as the Natal Coast. *M. Gelfand*

Surrey, A. R., Suter, C. M. & Buck, J. S. **New Anthelmintics. The Synthesis of some 9-Hydroxyalkyl- and Dihydroxyalkyl-aminoalkylaminoacridines.** *J. Amer. Chem. Soc.* 1952, Aug. 20, v. 74, No. 16, 4102–3.

Camain, R., Vernier, J., Navarranne, P. & Ayite, E. Schistosomiase cervico-vaginale à *S. haematobium*. [**Cervico-Vaginal Schistosomiasis due to** *S. haematobium*] *Bull. Méd. de l'Afrique Occidentale Française*. 1952, v. 9, No. 1, 81–4.

An account of 2 cases.

Watson, J. M., Fawzi, M. & Damluji, S. **Clinical Investigations on the Treatment of Urinary Bilharziasis. Part IV. Further Observations on the Use of Miracil D.** *J. Trop. Med. & Hyg.* 1952, Aug., v. 56, No. 8, 176–81. [10 refs.]

Watson *et al.* found Nilodin [Miracil D] given orally in enteric-coated tablets to be effective in the treatment of cases of *Schistosoma haematobium* infection in Iraq [this *Bulletin*, 1951, v. 48, 1005]. Alves [*ibid.*, 1950, v. 47, 1006] in S. Rhodesia reported differences in effectiveness when enteric-coated as opposed to plain tablets of the drug were used. Arrangements were made to treat patients in the Children's Hospital in Baghdad with plain tablets of Nilodin at a dosage similar to that previously employed ; this was a total of about 100 mgm. per kgm. of body weight given in two doses daily for 5 days. Twenty-four patients (17 males and 7 females) ranging in age from 6 years to 60 years, all suffering from parasitically proven *S. haematobium* infections, were the subject of the experiment. The follow-up in most cases was inadequate owing to the failure of the patients to return regularly for re-examination : 3 patients are excluded as observation was incomplete. Fourteen of the remaining 21 were regarded as cured of their infections, as judged by hatching tests and the disappearance of ova from centrifuged specimens of urine. The 7 patients who were not cured all had suffered from very heavy infestations ; but the treatment caused a marked reduction in the number of living ova subsequently found in the urine. Two of these 7 patients had a second course of the treatment after a 3-week interval ; but even then the infection was not eradicated. Another of these 7 patients was subsequently given 2 courses of treatment with Fantorin (sodium antimony biscatechol disulphonate) ; this equally failed to eradicate the infection.

The toxic side-effects of Nilodin given in plain tablets seemed less than those reported in the experiment where enteric-coated tablets of the drug were used. In one case there was yellow staining of the skin and of the clothing ; in another, a multiparous woman 4 months pregnant, there was gastro-intestinal disturbance and abortion occurred ; and in 5 other cases there were nausea and vomiting with anorexia, abdominal pain and constipation. Nevertheless the symptoms were transient and lasted for only a few hours after swallowing the drug.

In this experiment treatment with Miracil D in plain tablets proved rather less curative than did that with the enteric-coated tablets used by the authors in their earlier experiment. But the conditions of trial were not strictly comparable, and the criteria of cure were more exacting in this latest work. Toxic side-effects seemed to be less with the plain tablets than the coated ; but here again the conditions of experiment differed, and the subjects employed in the trial of enteric-coated tablets had obvious reasons for exaggerating any side-effects they may have suffered. On balance, therefore, Nilodin D in a dosage of 100 mgm. per kgm., given as 10 mgm. per kgm. twice daily for 5 days, either in enteric-coated or in plain tablets, may be regarded as adequately effective in the treatment of *S. haematobium* infections. *A. R. D. Adams*

KUNTZ, R. E. **Natural Infection of an Egyptian Gerbil with** *Schistosoma mansoni*. *Proc. Helminthological Soc. of Washington.* 1952, July, v. 19, No. 2, 123–4.

Although *S. japonicum* is frequently found in mammals in Eastern areas of schistosomiasis natural reservoir hosts for *S. mansoni* or *S. haematobium* have not been recorded, except in the case of monkeys [this *Bulletin*, 1929, v. 26, 533].

The present author has found in laboratory experiments [unpublished] that a number of village and desert rodents in Egypt are susceptible to infection with *S. mansoni*. He therefore examined some 200 small mammals (*Acomys, Arvicanthis, Crocidura, Mus* and *Rattus*) from the neighbourhood of villages where the incidence of schistosomiasis was high, but found no natural infection in them : this was surprising, since some, and particularly *Arvicanthis*, are readily infected with *S. mansoni* in the laboratory and the latter mammal has some preference for the edges of canals.

Several species of desert gerbils and the jerboa are susceptible to *S. mansoni* under laboratory conditions, but one would not expect natural infections in them since they require little water and can survive for days without it. Nevertheless, the author, during these routine examinations, found 3 immature female schistosomes identified as *S. mansoni* in the portal vessels of a single *Gerbillus p. pyramidum* taken 20 miles north-west of Cairo.

It is suggested that the rodent may have been infected by eating a *Biomphalaria boissyi*, itself infected with *S. mansoni*. It was shown that this gerbil will eat living snails and the worms were found about a month after a flood (when snails may be stranded on land after the floods subside) : furthermore the fact that all 3 worms were of the same sex suggests a possible origin from a single snail.

It is stated that this is the first record of a natural infection of *S. mansoni* in rodents : the possible implications of such findings are stressed.

H. J. O'D. Burke-Gaffney

SCHWETZ, J. Recherches malaco-schistosomiques aux Lacs Albert, Edouard et Kivu et dans plusieurs localités voisines. [**Snail Studies in Relation to Schistosomiasis at Lakes Albert, Edward and Kivu and in Several Neighbouring Localities**] *Inst. Roy. Colonial Belge. Sect. des Sci. Naturelles et Méd. Mémoires.* (Collection in —8°.) 1951, v. 19, No. 5, 73 pp., 6 maps & 16 figs. on 4 pls. [18 refs.]

DUKE, B. O. L. **On the Route of Emergence of the Cercariae of** *Schistosoma mansoni* **from** *Australorbis glabratus*. *J. Helminthology.* 1952, v. 26, Nos. 2/3, 133–46, 17 figs. & 1 pl. [13 refs.]

There seems little evidence to support the theory of FAUST and HOFFMAN [this *Bulletin*, 1935, v. 32, 245] that the cercariae travel down between the snail and its shell, and it seems more probable that having emerged from the sporocysts in the peri-hepatic space, the cercariae travel with the main flow of venous blood which passes from the visceral hump down beside the rectum to the pseudobranch and collar. The presence of the cercariae at these sites results in the production of a bleb, sometimes as big as a pin's head, in the snail's integument, and from this bleb the cercariae escape into the surrounding water with active wriggling movements. The function of the escape glands described by GORDON and GRIFFITHS [*ibid.*, 1952, v. 49, 1055] is " most probably to bring about the penetration of the epithelium and muscle overlying the blebs ".

An additional point, of considerable interest, in this paper is the confirmation of BRUMPT's findings [*ibid.*, 1942, v. 39, 866] of the presence of cercariae within the eggs laid by infected snails.

The author points out that a knowledge of the anatomy of the snail is essential to the understanding of cercarial emergence and he has provided an excellent diagram, founded on his own observations and those of previous writers, which shows the paths followed by the cercariae until they emerge in the manner already described. *R. M. Gordon*

DE BONT, A. F. & DE BONT HERS, M. J. **Mollusc Control and Fish-Farming in Central Africa.** [Correspondence.] *Nature.* 1952, Aug. 23, v. 170, 323–4.

Fish of a species of *Serranochromis* feed on molluscs, including *Physopsis* and *Biomphalaria*, and may be useful in control of schistosomiasis ; they can live and breed in ponds. *Chrysichtys mabusi* also feeds on molluscs, and may be useful for mollusc control in large permanent waters. *Charles Wilcocks*

WASICKY, R. & UNTI, O. Experiências com algumas substâncias sôbre *Australorbis*. [**Trial of Certain Substances Against** *Australorbis*] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1951, Dec., v. 16, No. 50, 237–46.

The English summary appended to the paper is as follows :—

" There have been studied, in laboratory tests, in drinking water, toxic concentrations for the *Australorbis glabratus*, a transmissor of the *Schistosoma*, of the following substances : copper sulphate, diclorofenoxi-copper acetate, sodium pentaclorophenolate, sodium chloride, magnesium sulphate, seeds of *Eurythina crista galli*, picric acid, potassium dichromate barium chlorate, zinc sulphate, nicotin, helenina (a mixture of alanto and of isoalantolactonate), rotenone, hexilresorcinol, a mixture of resorcinol with copper sulphate and quinina formiate.

" Copper sulphate, diclorofenoxi-copper acetate and sodium pentaclorophenolate have produced a strong action, it is being worth of mention that, in dilutions of 1 : 1,500,000 they have shown total molluscicide effect, in 96 hours. Also rotenone, helenina and hexilresorcinol have had strong toxic action. However, in practical cases, in the campaign against the intermediate bearer of the *Schistosoma*, copper sulphate seems to be the most economical agent.

" Copper sulphate, diclorofenoxi-copper acetate and sodium pentaclorophenolate have in contact with plants or organic matter.

" Copper sulphate has been found to be more active in the temperature of 25°C, inasmuch it has been powerful, also, at 37°C. At 4°C its effect has been much more weak.

" In the tests when the snails have had a short contact with the molluscicide, it has been found necessary concentrations of 1 : 20,000 and, also, the time of 30 minutes of contact in order to obtain a lethal effect of 100% on the animals, washed and, to follow, left for 48 hours in drinking water without any drug."

DEWITT, W. B. *Pomatiopsis lapidaria*, **its Occurrence in the Washington, D.C. Area and its Laboratory Rearing in comparison to that of** *Oncomelania* **spp.** *J. Parasitology.* 1952, Aug., v. 38, No. 4, Sect. 1, 321–6. [17 refs.]

" *Pomatiopsis lapidaria*, a potential intermediate host of *Schistosoma japonicum*, is found in rather large numbers in 3 marshy areas along the edge of the Potomac River in the vicinity of Washington, D.C. The habits and

habitats of this snail as found in these areas are described. Laboratory rearing techniques are presented whereby *P. lapidaria* and 4 species of *Oncomelania* may be maintained in aquaterraria."

WARDLE, R. A. & MCLEOD, J. A. **The Zoology of Tapeworms.**

This book was reviewed on p. 1011.

WEINSTEIN, P. P. & APPELGET, J. G. **Some Observations on *Diphyllobothrium latum* from Shagwa Lake, Minnesota.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 302–6. [12 refs.]

The authors required adult specimens of *Diphyllobothrium latum* for physiological work and collected plerocercoids from wall-eyed pike, great northern pike, yellow perch and tullibee fish in Shagwa Lake, Ely, Minnesota, studying at the same time the incidence of the plerocercoids in these fish. The incidence in fish in this lake has been high for many years.

The fish were kept packed in ice for about a week before they were dissected. The plerocercoids were then teased out of the muscles, only those found in the muscles being considered. Table 1 shows the incidence of the larvae in the fish mentioned above. It was as high as that reported by others to whose work references are given. The youngest wall-eyed pike, 2 to 3 years old, had the fewest plerocercoids, the number of which increased with the age of the fish.

The plerocercoids were given intra-oesophageally in gelatin capsules to 8 dogs free from *D. latum* and 6 of these dogs passed eggs of the tapeworm. Adult *D. latum* were, however, found in only 4 of the 6 dogs that passed eggs. Of the 47 plerocercoids given to these 4 dogs, 15 (40·5 per cent.) developed into adult worms.

References are made to corresponding numbers of adult worms found by other workers. The authors conclude that the other two dogs that passed eggs had expelled the tapeworms a day or two before they were examined.

Dogs 2 to 3 years old took the infection as readily as dogs 5 months old. One dog also had *Dipylidium caninum* and one that did not take the infection with *D. latum* had *Taenia pisiformis*.

Attempts to infect guineapigs, rabbits, rats and one *Rhesus* monkey failed. WARD [this *Bulletin*, 1929, v. 26, 536] failed to infect kittens, adult cats and guineapigs. WARDLE (1935, *Bull. No. 45, Biol. Board of Canada*) found that *D. latum* developed slowly in the cat and was not adult in 6 weeks and he doubted whether *D. latum* becomes mature in any hosts other than man, the bear and the dog.

The literature on the effects of low temperatures on the plerocercoids is discussed. The authors successfully infected a dog with plerocercoids that had been kept at −2°C. to 5°C. for at least 42 to 46 days. Adult worms developed from these plerocercoids. Wardle (*op. cit.*) concluded that the temperature most favourable to the plerocercoids is between 38° and −2·8°C. The other authors whose work is quoted found that the plerocercoids did not develop after exposure to −9°C. for 48 hours, −10°C. for 88, 40 or 16 hours or −11°C. for 24 hours.

G. Lapage

PEREIRA, R. B. Ação tenífuga dos derivados da acridina. [**Treatment of Taeniasis by Acridine Derivatives**] *Hospital.* Rio de Janeiro. 1951, Oct., v. 40, No. 4, 595–603. English summary.

The commonest cestodes met with [in Minas Gerais apparently, but this is nowhere definitely stated] are *Taenia saginata, T. solium* and *Hymenolepis nana*. Infestation by the first is the most frequent, but the second is more

important because of cysticercosis affecting the brain, the eye, and the subcutaneous and muscular tissues. NEGHME and FAIGUENBAUM affirm that some 6 to 8 per cent. of cerebral tumours operated upon in the Salvador Hospital, Chile, are those of cysticercosis. Extract of *Filix mas* is a good anthelmintic, but may be toxic. The author has, therefore, again made trial of an acridine derivative, atebrin (mepacrine) [see also this *Bulletin*, 1947, v. 44, 734]. Its use for this purpose originated when the drug was being used in anti-malarial campaigns in South America and it was noticed that those infested would often expel the worms.

The present paper refers to 10 patients, 6 males, 4 females, of ages ranging between 8 and 67 years. The symptoms in most comprised nausea, vomiting, anorexia or bulimia, and vague abdominal pains, and the nervous symptoms of restlessness and insomnia. Adults were given 8 tablets of atebrin or quinacrine (mepacrine), each of 0·1 gm., children 5–6 tablets according to age. The tablets might be given at 5-minute intervals or in two doses at 30 minutes' interval, and 2 hours later a saline aperient of magnesium or sodium sulphate. Beyond mild nausea in one or two, there were no signs of intolerance. The only preliminary preparation is diet mainly milk, to obviate too solid a residue ; some authorities advocate a preliminary simple enema to clear the bowel.

Of the 10 patients 4 were promptly cured, worm and scolex being eliminated ; in 4 others the worm was discharged but the scolex was not found ; the patients, however, continued well when seen 3–4 months afterwards ; 2 are still under observation. In case of doubt the administration may be repeated after 3–4 weeks. All the worms eliminated were specimens of *T. saginata*.

The action of mepacrine on *Ascaris suis* was also tried in concentrations of 1·0, 0·5 and 0·1 per cent. in physiological saline at 37°C. The action was, on the whole, slow. The 1·0 per cent. killed the worms in 12 hours ; the 0·5 per cent. killed 3 out of 5 in 24 hours ; the 0·1 per cent. had no effect in 24 hours, even movement was not impeded. *H. Harold Scott*

FIDALGO DÍAZ, J. Un caso personal raro de abdomen agudo por quiste hidatídico hepático. [**An Unusual Case of Acute Abdomen from a Hydatid Cyst of the Liver**] *Med. Colonial.* Madrid. 1952, Aug. 1, v. 20, No. 2, 133–7, 1 fig.

HARADA, F. **Investigations of Hookworm Larvae. I. On the Phototropism of Infective Larvae of** *Ancylostoma caninum*. *Yokohama Med. Bull.* 1952, Feb., v. 3, No. 1, 34–8, 5 figs.

INNES, J. R. M. & SHOHO, C. **Nematodes, Nervous Disease, and Neurotropic Virus Infection. Observations in Animal Pathology of Probable Significance in Medical Neurology.** *Brit. Med. J.* 1952, Aug. 16, 366–8. [20 refs.]

The authors describe their observations and review the work of others on nematode invasion of the central nervous system, a subject which is important but imperfectly understood. An insect-borne cerebrospinal nematodiasis has been described which occurs in summer and autumn as an epizootic among sheep, goats and horses in the Orient. This condition which has also been recognized in goats in Ceylon is caused by the invasion of the brain or cord of unnatural hosts, such as sheep, goats and horses, by immature forms of *Setaria digitata*. The natural hosts of this filariid are cattle, in which it occurs in the peritoneal cavity and is non-pathogenic ; invasion and disturbance of the central nervous system apparently only occur when unnatural hosts become infected, and the infective larvae then migrate directly to the central nervous system. Such invasion is accompanied by a focal encephalomyelomalacia, usually with small, often microscopic, sparsely distributed lesions ; clinically,

there may be no signs, or the animals may show varying degrees of neuro-paralysis, the severity and extent of which depends upon the neuro-anatomical location of the lesions. The authors stress that post-mortem examination of such cases must be conducted with great care in order to determine the helminthic cause ; apart from the small size of the lesions and their sparse distribution in relation to the volume of the central nervous sytem, the difficulties are increased because the filariids, being notorious wanderers, may have wandered away from the lesion which they provoked and, in chronic cases, may have disintegrated. The authors state " Meningeal infiltrations with many eosinophils may be seen, sometimes extending to areas far from the malacic site : random selection of nervous tissue for sections might thus foster the idea that only an eosinophilic lymphocytic meningitis was present. . . . The process is an acute malacia in a restricted track followed by secondary degeneration of nerve-fibre tracts, and the gigantic swellings of axis cylinders (Wallerian degeneration) in, around, above, and below the malacia are a predominant feature. These findings are unmistakably diagnostic, and are consistent with our concept that the process is simply a mechanical traumatic effect of a wandering worm—now proved experimentally." The authors think that other nematodes might also be involved in the same or different species of animals.

In addition to the production of disease by such helminths, *per se*, it is suggested furthermore that such a nematode invasion may facilitate neurotropic virus infection and the authors speculate, on epidemiological evidence, that Japanese B virus encephalitis in animals and cerebrospinal nematodiasis (*Setaria digitata*), both mosquito-borne, may be inter-related. Attention is drawn to the report by BEAUTYMAN and WOOLF [this *Bulletin*, 1952, v. 49, 529] on a possible relationship between larval ascarid migration and the development of poliomyelitis in the case of a child who died from acute anterior poliomyelitis and in whose brain an *Ascaris* larva was discovered.

After a discussion on the migratory paths of helminths to the central nervous system, the authors consider the possibilities of an analogous cerebrospinal nematodiasis of animals occurring in man ; again the difficulties of diagnosis are stressed and it is suggested that several conditions in man, at present covered by vague terms, should be reconsidered as possibly helminthic in origin in the light of the authors' recent findings in veterinary pathology. In this connexion the authors refer especially to " reports of eosinophilic meningitis with focal malacia—with clinical acute paralytic signs (or those of transverse myelopathy) and a complete absence of evidence indicative of cause (virus, bacteria, or any other—but helminths never considered) ".

Finally, as indirect support for these ideas, reference is made to some recent American work on a human endophthalmitis now recognized as being associated with nematode invasion. The authors suggest that the human helminthic ocular lesions may result from the extension of nematode infection from a pre-existing intracranio-vertebral nematodiasis. In comparative studies, an analogous condition is to be found in horses in which an ocular filariasis caused by *Setaria* (*digitata* ?) has been recognized for many years in India ; such cases in the equine are sometimes associated with paraplegia (Kumri) and the authors believe that these are, in fact, cases of cerebrospinal nematodiasis.

Studies of this nature are only in their infancy and much is at present speculative. Further research on nematodes, nervous disease and neurotropic virus infection is necessary and the authors suggest that further evidence for the theory that the nervous system, and perhaps the eye, may be a site of attraction in unnatural hosts might be found by learning more about the behaviour of parasites in unnatural hosts, as compared with their behaviour in natural hosts.

R. B. Griffiths

NISHIMURA, T. [**Distribution and Behaviour of Eggs of** *Ascaris lumbricoides* **in the Nature. Report 2**] *Osaka Daigaku Igaku Zassi.* [*Med. J. Osaka Univ.* : Japanese Edit.] 1952, Apr., v. 4, No. 4, 283–9, 1 chart.

The English summary appended to the paper is as follows :—

" In the floor dust of public bath and primary and secondary school of Osaka city the author could detect several times the eggs of Ascaris lumbricoides, in average number of 6·3 and 0·15 per 1 gram of the dust respectively without a prominent seasonal difference. Regarding Enterobius, however, there have been found more eggs in both places. It is remarkable that of Ascaris eggs only 0·3–2% were matured and more than 60% remained still in one-cell stage. This fact seems to reveal that almost all eggs dropped on the floor are swept out every day and only small number of them are left to complete their development.

" In order to learn how the eggs of Ascaris in the dust develop, an experiment has been attempted during the months from July to August by means of that samples of dust with eggs were placed in the room, some of which were sprayed with water once a day while the others were kept dry. The result showed that those eggs in dry dust all died after 10 days, although 42% of them reached the late morula stage in 6 days. Of those in wet condition, however, 24–70% completed their development in 13–15 days, although they died soon thereafter.

" The facts mentioned above indicate that of the eggs dropped on the floor of two places where they are swept out every day, only few of them may become mature and survive for a comparatively short time causing only occasional infection."

GHOSH, K. K. **Acute Haemorrhagic Pancreatitis due to Round Worm.** *J. Indian Med. Ass.* 1952, July, v. 21, No. 10, 437–8, 2 figs. on pl.

The patient died and a dead worm—presumably *Ascaris*—was found impacted in the ampulla of Vater.

HOEKENGA, M. T. **Treatment of Ascariasis in Children with Hetrazan Syrup.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 688–92. [13 refs.]

In a brief survey of the literature of the treatment of ascariasis with hetrazan, the author points to discrepancies in results recorded by different workers and discusses possible explanations of them. He refers to his own previous investigations [this *Bulletin*, 1952, v. 49, 425] and that of LOUGHLIN *et al.* [*ibid.*, 424]. Stimulated by the latter workers' use of hetrazan syrup for ascariasis in children, Hoekenga has used such a syrup, containing 30 mgm. of hetrazan per cc. in a dosage of 6 mgm. of hetrazan per lb. weight once daily for 4 days.

In the first study, this treatment was given to 95 mestizo [half-caste] children, aged 2–7 years from banana plantations near La Lima, Honduras. Neither fasting nor purgation was necessary before or after the single early morning dose, which was diluted in 50–100 cc. of water. Stool examinations were done one week after the end of treatment and again in 2–3 weeks. Egg counts were not done, and the test of cure was absence of ova from concentrated stools on both occasions. In many cases where the first treatment was not successful, it was repeated a second or third time, with intervals of 3 weeks between courses.

In a second study, the treatment was given to a comparable group of 30 children, except that the dose was twice as large, *i.e.*, 12 mgm./lb. None of the children in this group was re-treated.

The results are shown in a table, which indicates that negative stools were obtained in the first study, in 36, 30 and 75 per cent. of cases after 1, 2 and 3

courses of treatment respectively. Even when complete absence of ova was not obtained, a large proportion of children passed adult worms, and although egg counts were not done, there was an impression that the number seen microscopically was markedly reduced.

In the second study, 24 of the 30 children were cured : 4 of the remaining 6 passed adult worms. No toxic effects were noted with the dosage used, but with higher doses given experimentally in a few cases (*e.g.*, 18 mgm. /lb.), there was evidence of toxicity.

The author warns against accepting negative stool examinations too early after treatment, as egg-laying may recur even after one week. It is admitted that the use of egg-counts would probably have reduced the percentage of cases recorded in this series.

The importance is stressed of taking into account the season of the year in which treatment is carried out. The first study began at the end of the rainy season when the worm burden was high, while the second re-treatment was carried out in the middle of the dry season, as was the second study. The high cure rates on this occasion must be interpreted in this light.

The author concludes that hetrazan syrup in a dose of 12 mgm. /lb. daily for 4 days is effective in the treatment of ascariasis in children. Higher doses tend to be toxic. Hetrazan may be a satisfactory vermifuge when fasting or purging are contra-indicated. It is very useful in private practice, but not ideal for mass treatment because multiple doses are required.

H. J. O'D. Burke-Gaffney

Wilson, J. F. **The Treatment of Larva Migrans with Stibanose. A Preliminary Report.** *Southern Med. J.* 1952, Feb., v. 45, No. 2, 127–30.

Larva migrans, or creeping eruption, is a serious infection along the Gulf and South Atlantic coasts in the southern United States. In 1950 over 7,000 cases were reported in Florida alone. As a rule the patients present multiple lesions, many of which are septic.

The condition is caused by infection with the larva of the dog and cat hookworm, *Ancylostoma braziliense*, which remains in the epidermis and migrates from place to place.

The author used Stibanose (C_{12} H_{25} NSb Na) in a 2 per cent. solution intramuscularly, 4 ml. daily for 6 days. Of 75 cases, a complete cure was achieved in 22, in 50 cases considerable improvement was effected, and in only 3 cases was the treatment a complete failure. After a course of treatment the patients were usually free from symptoms for a few days, when there was a slight recurrence of symptoms. The lesions were then treated locally by freezing and the application of ethyl-acetate collodion and cleared up rapidly. Ethyl-acetate was used locally in all cases.

L. E. Napier

Raghavan, N. G. S., Misra, B. G. & Roy, R. **Filarial Infections in Mosquitoes.** [Correspondence.] *Nature.* Aug. 9, 253.

Mosquitoes of the same species may be vectors of both human and animal filarial infections. This study, carried out in a village in Orissa, India, where *W. bancrofti* occurs in man, demonstrates the importance of correct diagnosis of infective forms of filarial infections in mosquitoes.

Of 3,307 *Culex fatigans* and 1,928 *Mansonioides annulifera* dissected, 55 of the former and 41 of the latter showed infective larval forms in the head/proboscis : some of the latter species had microfilariae in the Malpighian tubes. *M. annulifera* are not suitable vectors of *W. bancrofti* and *Wuchereria* develop in thoracic

muscles [this *Bulletin*, 1939, v. 36, 148], so search was therefore made for filariae of other origins. Infective larvae from *C. fatigans* were longer than those in *M. annulifera* and had more than one caudal protuberance, indicating that they were probably *Wuchereria*.

Precipitin tests of blood meals showed that *C. fatigans* had a higher predilection for human blood than had *M. annulifera*, which fed principally on domestic animals or birds.

Four of 40 dogs were shown to harbour microfilariae resembling *D. repens*. Clean *C. fatigans* and *M. annulifera* were fed on these dogs and on human beings harbouring *W. bancrofti*. A high percentage of *M. annulifera* became infected with *D. repens* and of *C. fatigans* with *W. bancrofti*, but each mosquito species was refractory to infection with the alternative filaria.

These results, in addition to indicating the need for careful interpretation of findings, incriminate *M. annulifera* as a vector of *D. repens*.

H. J. O'D. Burke-Gaffney

HAWKING, F. & THURSTON, June P. **The Periodicity of Microfilariae. I. The Distribution of Microfilariae in the Body.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Dec., v. 45, No. 3, 307–28, 9 figs. (4 on pl.) **II. The Explanation of its Production.** *Ibid.* 329–40. [55 refs.]

I. This is the first paper of a series dealing with the absorbing but tantalizing phenomenon of the periodicity of microfilariae. It will be read with interest and satisfaction by many who have either speculated about or experimented on the problem during the past 70 years ; for new experimental evidence of a positive kind is presented concerning the migration of microfilariae which may prove to be the penultimate step to elucidating the complete story of its mechanism.

The use of laboratory animals, monkeys and dogs, naturally infected with species of filarial worms having a nocturnal periodicity, has been responsible for this important contribution to the knowledge of the behaviour of the microfilariae. In these animals it was possible to follow the course of the 24-hour cycle in the peripheral blood and to estimate by biopsy or post-mortem the content of microfilariae in various organs by day or by night. Biopsy specimens and those removed at post-mortem examinations were sectioned, and a technique was employed whereby, after the number of microfilariae in a given section had been counted, the total number of microfilariae in an organ or piece of tissue could be calculated [HAWKING, SEWELL and THURSTON, this *Bulletin*, 1950, v. 47, 1019]. The material employed comprised (1) one *Macaca speciosa* infected with a species of *Dipetalonema* whose adults resembled *D. sunci* Sandground, 1933 and *D. digitata* (Chandler, 1929) ; (2) seven monkeys from East Africa, *Cercopithecus aethiops johnstoni*, infected with a species " probably belonging to the genus *Dirofilaria* ". The microfilariae of this parasite developed in *Aëdes aegypti* and less readily in *Anopheles maculipennis atroparvus* ; the infection was transmitted to other monkeys. (3) One *Cebus apella* with a non-periodic microfilaria " probably *Dipetalonema gracile* ". (4) Five dogs infected with a strain of *Dirofilaria repens* originating from Sardinia. [The authors' vagueness as to the identity of some of the parasites they were working with is surprising and regrettable, even though it does not affect the validity of their findings.] The periodicity of the microfilariae in *Macaca speciosa* and in *Cercopithecus aethiops johnstoni* was well marked ; that of the *D. repens* in the dogs was less complete.

The results of the experimental work are described in detail and lead to the conclusion that most of the microfilariae which disappear from the blood during

the daytime accumulate in the lungs, and that the periodicity is due to migration between these two sites. The essential points in the paper are well presented in the authors' summary as follows :

" Complete postmortem examinations have been made on five monkeys and four dogs, half of them killed at midday and half at midnight, respectively. Shortly before and after death (if it occurs in the day) great numbers of microfilariae are liberated from the lungs, so that the blood of the left ventricle contains many more than were present in the circulating blood before the animal was killed. This agonal event accounts for MANSON's erroneous suggestion that the microfilariae retired during the day to the heart and great vessels (as well as to the lungs).

"At postmortem examination, the organs of the body (apart from the lungs) contain only small numbers of microfilariae either by day or night. Over 80 per cent. of the total number of microfilariae in the body are usually contained in the lungs and in the blood. There are proportionately more microfilariae in the lungs of animals killed by day than in those killed by night, and conversely for the microfilariae in the blood.

" Pairs of specimens were taken for biopsy by day and by night respectively from most of the organs of the body. The microfilariae present in the liver, spleen, marrow, lymph glands, skin and muscle were relatively few, and often there were more present by night than by day. The lungs contained very many microfilariae at all times. In seven out of eight experiments there were more microfilariae in the lungs by day than there were by night and the accumulation of microfilariae in the lungs during the day was amply large enough to account for the microfilariae which had disappeared from the blood during this period.

" No evidence was obtained that the accumulation of microfilariae in the lung causes significant pathological lesions.

" Direct observations were made on the behaviour of living microfilariae in the intact circulation of infected cotton-rats and dogs. The microfilariae seemed to pass through the capillaries rapidly and smoothly ; and accumulation in the small vessels was not observed except as a terminal event before death of the host."

II. The second paper of this series is introduced by a brief review of previous theories on the mechanism of periodicity, and proceeds with an analytical discussion of the various possible mechanisms. The theory of LANE (revising that of MYERS) that each evening a new brood of microfilariae is produced and is destroyed within 24 hours before the next brood appears, is considered in some detail and dismissed as untenable because of the weight of evidence against it. If this theory be rejected, the basic assumption in Manson's theory must be accepted, namely that the microfilariae do not die so rapidly, and they appear in and disappear from the peripheral blood by a to-and-fro migration between the peripheral blood and other parts of the body. Moreover there is evidence to show that the number of microfilariae in the peripheral blood at any given time is similar to that in the general circulation, so that the migration may be assumed to take place betwen the circulatory system and some other organ or organs in the body. The experimental evidence in the previous paper indicates that the principal organ involved is the lung. The implications of this conclusion are discussed and under the heading " Why should microfilariae accumulate in the lungs during the day ? " reference is made to the biological purpose of periodicity and its relation to the biting habits of the insect vector. " Using anthropomorphic imagery we must postulate that there is a site in the body (*i.e.*, the lung) which is particularly favourable for the microfilariae and where they would prefer to spend all their time if they could. But if they did, they would never encounter the insect vector

and so would not be transmitted to other hosts. Accordingly, a compromise has been evolved, by which the microfilariae leave their favoured site (the lung) in the evening and circulate in the peripheral blood, so as to give a chance for transmission to occur ; but in the morning the microfilariae return to the lung to rest and recuperate for the remainder of the 24 hours."

The mechanism of this periodic liberation from and accumulation in the small vessels of the lungs is unknown but is presumed, in view of its association with the waking and sleeping habits of the host, to be connected with some hypothetical chemical change in the blood which promotes both the sleepiness of the host and the liberation of the microfilariae in the evening and acts conversely in the morning. *J. J. C. Buckley*

CASILE, M. Les formes génitales de la filariose de Bancroft en Guyane Française. [**Genital Forms of Bancroftian Filariasis in French Guiana**] *Méd. Trop.* Marseilles. 1952, May–June, v. 12, No. 3, 282–306. [43 refs.]

Those who have in the past attempted to determine the endemicity of filariasis in French Guiana have given results varying from 28 to 12 per cent. and have concluded that on the whole there has been a fall in the incidence of this disease. On the other hand from the surgical standpoint it appears that the figures given are far below reality. Among the surgical manifestations that have presented themselves the figures of carriers of " filaria nocturna " are 71·5 per cent., that is apart from cases of elephantiasis and lymphangitis. The introduction of auxiliary methods of diagnosis has tended to show that this infection is more important than has been hitherto supposed.

The vector is *Culex fatigans* and the natural infection rate in these insects is 11 per cent. A special campaign should be organized to eradicate the mosquito as DDT-spraying has proved ineffective.

Means of diagnosis consist of various methods of demonstrating the microfilariae or adult worms in genital lesions, examination of biopsy material, the associated eosinophilia, the intradermal and complement-fixation tests, in addition to carefully conducted clinical examination.

Although hydroceles are undoubtedly filarial manifestations, the author has only once succeeded in finding microfilariae in the fluid and on one occasion only has he been able to demonstrate the adult filaria in an abscess of the epididymis. The intradermal reaction has been tried out on 15 occasions with satisfactory results ; there were only 3 controls, which were negative.

The paper concludes with descriptions of various genital manifestations, such as acute and subacute funiculitis, filarial hydroceles, filarial varicocele, chronic funiculitis, pedunculated inguino-scrotal lymphangioma, filarial orchitis and epididymitis. Details are given of 13 typical cases, chosen from 53 seen between 1945 and 1951. Brief statistics are given for all 53.

In spite of the title of this paper the material which comprises it must be rated as sketchy. *Philip Manson-Bahr*

HAWKING, F., ORMEROD, W. E., THURSTON, June P. & WEBBER, W. A. F. **The Antifilarial Action and Toxicity of Methylene Violet and of other Compounds of the Phenosafranine Series.** *Brit. J. Pharmacol. & Chemotherapy.* 1952, Sept., v. 7, No. 3, 494–508, 1 fig.

As the authors point out, compounds of the phenosafranine series are difficult to purify and the figures quoted for toxicity and biological activity are therefore subject to some error. Preliminary tests were carried out on cotton rats infected with the filarial worm *Litomosoides carinii* by injecting the animals intraperitoneally once each day for 6 successive days with the required dose of drug.

Six days later the animals were killed and examined for the presence of adult worms in the pleural cavity and for microfilariae in the blood. *In vitro* tests were also made on both stages of the parasite [see this *Bulletin*, 1950, v. 47, 1019, 1023]. Some of the compounds possessed chemotherapeutic activity against the adult worms *in vivo* but not on the microfilariae *in vivo*, and they were affected to a limited extent only *in vitro*. Active compounds in the phenosafranine series apparently all had an aryl group attached to a quaternary nitrogen atom. Methylene violet was further examined as it was most readily available and in a fairly pure state. Purity was increased by chromatographic treatment. Its toxicity in mice, cotton rats, rabbits, and monkeys was determined. Poor absorption resulted from oral administration, but on intravenous administration the drug passed rapidly from blood to tissues, the substance being excreted mainly in the urine. Toxic effects resulted and lesions were present mainly in liver and kidneys. The results of clinical trials with methylene violet in the Gambia, where approximately 50 patients were treated intravenously with 10 to 14 daily doses of the drug, an average total dose of 8 to 12·6 mgm. per kilo, showed that the drug was well tolerated apart from the presence of albuminuria. It was, however, without action on larval forms of *Wuchereria bancrofti*, *Dipetalonema perstans*, or in the one case of infection with *Onchocerca volvulus* tested. *J. D. Fulton*

Gibson, C. L. & Ascoli, W. F. **The Relation of *Culicoides* (Diptera : Heleidae) to the Transmission of *Onchocerca volvulus*.** *J. Parasitology*. 1952, Aug., v. 38, No. 4, Sect. 1, 315–20, 1 fig. [18 refs.]

This paper begins with a brief summary of the literature concerned with the transmission of various mammalian filarial infections by midges, mainly in relation to the genus *Culicoides*, particular attention being drawn to the disputed transmission of *Acanthocheilonema* [*Dipetalonema*] *perstans* by *C. austeni* and *C. grahami* [this *Bulletin*, 1950, v. 47, 65, 66].

In view of Vargas's suggestion [this *Bulletin*, 1942, v. 39, 778] that *Culicoides* might be involved in the transmission of onchocerciasis to man, the authors tried to determine whether these flies served as intermediate hosts of the parasite in America, in addition to the several species of *Simulium* already known to transmit the disease. Their summary of the results of their investigation is as follows :—

" 1. Four anthropophilic species of *Culicoides* have been found in the San Pedro Yepocapa region of the onchocerciasis zone in Guatemala. These are *C. paraensis*, *C. guttatus*, *C. gibsoni* and *C. stigmalis*.

" 2. No evidence of natural infection with filarid larvae was found in dissections of 929 wild flies of the four species. The series of dissections of *C. guttatus* and *C. gibsoni* are too small to permit valid conclusions, however.

" 3. Experimental infection studies were made by capturing 929 flies, representing all four species, as they fed on a human volunteer heavily infected with microfilariae of *Onchocerca volvulus*. *C. pareansis* was incapable of ingesting microfilariae. In the case of *C. stigmalis*, 19·0 per cent became infected but the ingested microfilariae underwent no perceptible development. One of 47 specimens of *C. guttatus* which fed on the infected patient ingested microfilariae, but the fly died within 15 hours. No flies of *C. gibsoni* ingested microfilariae, but the number of specimens (10) available is too small to allow definite conclusions.

" 4. Flies of the species *C. stigmalis* which ingested microfilariae from the infected patient died much more rapidly than did uninfected flies. This fact, together with the failure of microfilariae to undergo development, indicates that

this species is not a suitable intermediate host for *O. volvulus*. It is further concluded that *C. paraensis* is unsatisfactory as an intermediate host because of its inability to ingest microfilariae. *C. guttatus* and *C. gibsoni* may be potentially capable of transmitting human onchocerciasis, but their rarity makes it most unlikely that they are actually involved." *R. M. Gordon*

THOMAS, L. J. *Gongylonema pulchrum*, **a Spirurid Nematode infecting Man in Illinois, U.S.A.** *Proc. Helminthological Soc. of Washington.* 1952, July, v. 19, No. 2, 124–6. [15 refs.]

The author records the case of a man of 20, born and bred in Illinois, who extracted a nearly mature female *Gongylonema pulchrum* from the mucous membrane of his lower lip, some six months after he felt it moving about there. He had been in Mexico in 1948 : he did not recall drinking from streams there, but did eat fresh salads. During summer vacation near his home in Illinois he had taken water directly from springs. It is probable, therefore, that he was infected from drinking water or food.

In a review of the literature, the author notes that this is the sixteenth case of *Gongylonema* recorded in the world [this *Bulletin*, 1951, v. 48, 667 *bis*] and the seventh from the United States.

Measurements of the worm found in this case are given and compared with those of a specimen taken from a black bear and reported by CHANDLER (*J. Parasit.*, 1950, v. 36, 86) : the measurements in the present case were similar.

H. J. O'D. Burke-Gaffney

HAEMATOLOGY

MEDICAL RESEARCH COUNCIL. SUB-COMMITTEE ON ANALYTICAL METHODS [HARINGTON, C. R., Chairman]. **The Estimation of Haemoglobin. Collected reports on work initiated by a special Sub-Committee set up by the Medical Research Council during the War of 1939–45.** (Series of Eight Papers reprinted from *The Lancet*.) 103 pp., 1952. London : The Lancet Office, 7, Adam St., Adelphi, W.C.2.

This monograph contains under one cover a series of papers reprinted from the *Lancet* and which appeared between 1948 and 1951. They have already been abstracted in this *Bulletin*, but readers will find set out in the Introduction the history of the events leading up to the final development of the M.R.C. photometer, by a group set up by the sub-committee on Analytical Methods of the Medical Research Council.

The results show striking evidence of very careful and accurate scientific investigation, an immense amount of patient and detailed application and an admirable example of team work, all of which has succeeded in removing previous errors and fallacies in the estimation of haemoglobin.

H. J. O'D. Burke-Gaffney

SWAMY, T. V. & DUTTA, B. B. **An Easy Way of determining Corpuscular Values by the Use of a Line Chart.** *Indian Med. Gaz.* 1952, July, v. 87, No. 7, 300–302, 1 chart.

Khalifa, A. A. & Salah, M. K. **A Survey of the Haemoglobin Content of Blood of Egyptians.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, Nos. 9/10, 647–59, 10 figs.

Haemoglobin estimations were made of the blood of 234 Egyptians ; the subjects were chosen at random from the army, navy and staff of the Faculty of Medicine in Alexandria. They were examined clinically and found to be free from any obvious disease and the stools and urine were examined for parasites.

The mean of the whole series was 13·10 gm. per cent. and 92·5 per cent. were between 11 and 15·99 gm. per cent. Of the total, 52 subjects were free from parasites and showed a haemoglobin percentage of 14·23 gm. ; all but 5 showed 13 gm. or more and none less than 11 gm. The mean of the haemoglobin of those infected with *Schistosoma*, hookworm, or *Ascaris* was 12·76 gm. per cent.

The authors note that healthy Egyptians thus have a haemoglobin that is almost up to American standards and that parasitic infection does not reduce the percentage materially.

They used a spectrophotometric method for estimating the haemoglobin as acid haematin, which they found the most stable derivative ; it was as follows :—

" 0·02 ml. of blood, collected in a micro pipette from a finger prick is added to 10 ml. N/10 HCl in a test tube, and shaken. After 10 minutes, the intensity of absorption of the acid haematin solution is measured in the spectrophotometer at 372·5 mμ using a 1 cm. cell and decinormal hydrochloric acid as a compensator. The percentage of haemoglobin in the blood can be calculated by multiplying the intensity at 372·5 mμ by 15·5." *L. E. Napier*

Foy, H., Kondi, Athena & Hargreaves, A. **Anaemias of Africans.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, May, v. 46, No. 3, 327–58, 8 figs. & 2 pls. [69 refs.]

The authors have investigated anaemias of Africans in Kenya and have divided them into 4 groups :—

(1) The numerically most important type was the hypochromic anaemia which was particularly prevalent in the coastal regions. The average M.C.V., M.C.H. and M.C.H.C. were low, the serum bilirubin was never raised and the reticulocytes before treatment varied between 0·1 and 6 per cent. The majority of the patients had a predominantly micronormoblastic bone marrow and there was no evidence of dyshaemopoiesis in the red cell production. In a proportion of the patients giant stab cells were found in the marrow, considered by the authors as evidence of dyshaemopoiesis in the white cell line.

These hypochromic anaemias were the result of iron deficiency presumably caused by peripheral bleeding due to parasites. There may also have been deficiency of available iron in the diet, but generally speaking the food of the African contains adequate amounts of this element. Treatment consisted in iron medication ; removal of parasites was effective, but this is sometimes dangerous in grossly anaemic people. Patients showing giant stab cells in the marrow responded more slowly to iron therapy and a more rapid cure was obtained by a combination of iron with liver or folic acid.

(2) In the Highlands of Kenya the normo- or hyperchromic anaemia prevailed ; the average M.C.V. was above normal and the indirect Van den Bergh test for serum bilirubin showed raised values. There were always giant stab cells in the bone marrow, but not all cases showed dyshaemopoietic derangement of the red cell line, *i.e.*, the bone marrow could be either megaloblastic or macronormoblastic. In either case the anaemia responded to haemopoietic substances such as liver, folic acid, vitamin B_{12} and penicillin.

Sometimes there was pyrexia and provided there was no underlying infectious process this too disappeared on the administration of haemopoietic substances.

(3) Another important group both at the coast and in Central Kenya was that of the haemolytic splenic anaemias. In these cases there was generally an enormously enlarged spleen, the bone marrow was active and erythroblastic, the number of reticulocytes could be as high as 20 per cent. of the red cells and the indirect Van den Bergh test could show values up to 6 mgm. per cent. Transfused cells, estimated by differential agglutination, had a length of life between 15 and 30 days only. Splenectomy was the only satisfactory treatment, but in a number of cases there were relapses associated with liver disease.

(4) The fourth type of anaemia was sickle-cell anaemia. The blood picture was normo- or macrocytic and the bone marrow was hyperplastic. The indirect Van den Bergh test showed raised values. On the whole the authors are inclined to expect sickle-cell anaemia in all homozygotes (SS) though of the parents of the patient described in the paper as SS the mother only and not the father was a sickle-cell-trait carrier. There is a detailed discussion of the possible anthropological significance of the sickle-cell trait and of the differential diagnosis between sickle-cell anaemia and anaemia due to other causes in a carrier of the sickle-cell trait. Particular emphasis is laid on the value of incubation of the blood at 37°C. for 12 hours as a test for sickle-cell anaemia as opposed to trait. Only in the case of specific anaemia did the authors find a filamentous type of sickling in this test.

In a wide and thorough discussion the authors explain among other points why they consider the presence of giant stab cells in the bone marrow as the first sign of general dyshaemopoiesis with a significance for both the white and red cell production and give their views on the classification of the megaloblasts.

The paper is illustrated by numerous tables, diagrams and 3 photomicrographs.

[The conception of gaint stab cells as indicators of dyshaemopoiesis in the red cell line in the absence of megaloblasts opens up new opportunities. It may yield an explanation for the contradictory findings in India where a macrocytic anaemia responding to liver principle may or may not show megaloblasts in the marrow. It will be of great importance for the understanding of comparable anaemias in Africa and in India to establish whether those in India are also uniform in as much as they all show giant stab cells. On the other hand it will also be relevant to extend observations on the presence or absence of giant stab cells in infectious and metabolic diseases without anaemia.]

See also this *Bulletin*, 1951, v. 48, 67, 918. *H. Lehmann*

Foy, H. & Kondi, Athena. **Pernicious Anaemia and Macrocytic Anaemia in Uganda.** [Correspondence.] *Lancet*. 1952, Feb. 23, 416–17.

The correspondents criticize Trowell's article on pernicious anaemia and macrocytic anaemia in Africans in Uganda [this *Bulletin*, 1952, v. 49, 536] and emphasize that microcytic anaemia is not as rare elsewhere in Africa as he reports that it is in Uganda. Further, they point out that Lehmann [*ibid.*, 1949, v. 46, 664] found a high percentage of microcytic hypochromic cases in his series in Uganda.

In their experiences in tropical and subtropical Africa they have encountered patients with the M.C.H. and M.C.V. as low as 9·0 $\gamma\gamma$ and 45 c.μ. respectively, and the M.C.H.C. down to 18 per cent.

The hypochromic microcytic blood pictures were usually associated with helminthic infections.

The African diet usually contains a normal sufficiency of iron which is often supplemented by the cooking of food in iron utensils. The authors question, therefore, whether iron deficiency plays an important part and suggest that

possibly failure of absorption and utilization, as well as the blood loss from the depredations of worms, are the causes. The correspondents point out that these hypochromic-microcytic blood pictures do not become macrocytic in the ordinarily accepted sense of the word when iron is given ; there is an increase of reticulocytes which naturally results in an increase of the M.C.V. (mean corpuscular volume), M.C.D. (diameter), and M.C.A.T. (average thickness). This is not evidence of any underlying macrocytic tendency, and therefore the word " dimorphic " is unnecessary. They claim that there is no mystery about the anaemias in Africans ; they fall into all the recognized groups.

While they have seen typical orthochromic megaloblasts characteristic of pernicious anaemia in their Macedonian and Indian cases, many show only the intermediate type of megaloblast. The response to treatment is the same in each case and it is now well established that the megaloblastic anaemias of these countries and those of Africa respond to refined as well as to crude liver extracts. In these circumstances, Trowell would have been better advised not to claim his case as one of pernicious anaemia in the absence of any tests for the presence of the intrinsic factor.

The correspondents state that they recently encountered an African in whom the intrinsic factor was absent, and that they consider this a definite case of pernicious anaemia.

They disagree with Trowell that morphological studies have played too important a part in the diagnosis of " macrocytic " anaemias in Africans, and they consider that, if the African anaemias are to be clearly defined, precise and detailed information in all cases is as necessary as in the study of anaemias in other countries. *L. E. Napier*

TREDRE, R. F. **Observations on Minor Degrees of Anaemia in East African Workers.** *J. Trop. Med. & Hyg.* 1952, July, v. 55, No. 7, 149–55.

In this paper it is pointed out that in the tropics large numbers of people who neither seek nor receive medical treatment have a minor degree of anaemia. The physical performance of these persons is suboptimal and in industry this may be an important matter. In 1948 the author found that half the so-called fit workers in the sisal industry of Tanga Province, Tanganyika, had a haemoglobin concentration of below 70 per cent. as determined by the Tallqvist method [this *Bulletin*, 1950, v. 47, 167]. In that year spraying with residual insecticides was introduced on certain of the estates in Tanga Province, and was carried out at intervals of 3 months. Early in 1951 a further haematological and parasitic survey was conducted.

The first group of persons examined consisted of 12 male African adults living in a well-sited village where rations were adequate ; of these 9 were found to be free from parasitic infections and their haematological values were within the usually accepted normal range. The second group consisted of employees from various estates, and all were infected either with malaria, intestinal worms or schistosomiasis, and a third group consisted of persons with multiple parasitic infections. Those with either malaria or *Schistosoma haematobium* infection had no marked haematological abnormalities. In persons with mixed hookworm, schistosomal and *Ascaris* infections, the predominating cause of anaemia appeared to be the presence of hookworms. The majority of those with hookworm infections had no anaemia but their satisfactory haemoglobin and red cell counts were attained only by increased blood production. It is suggested that anaemia in these cases occurs only when the diet is inadequate and then a microcytic hypochromic anaemia develops.

Because of the increased demands on the haemopoietic tissue in persons with parasitic infections, and especially in those infected with hookworms, it is suggested that treatment should be given irrespective of the degree of haemoglobin concentration in the blood.

[This paper is of particular importance to medical officers in charge of labour forces in the tropics and to those concerned with nutrition. The original should be consulted for details of haematological values ; those for individual cases within the various groups are there given in full.] *A. W. Woodruff*

Squires, B. T. **Serum Iron in the Tswana (Bechuanaland).** *South African J. Med. Sci.* 1952, June, v. 17, No. 1, 1–2. [10 refs.]

Das Gupta, C. R., with statistical help from C. Chandrashekhar. **Blood Picture of Indians at High Altitudes.** *Indian Med. Gaz.* 1952, Mar., v. 87, No. 3, 95–100.

Blood studies were made on groups of Indians living at high altitudes, at Kalimpong (3,933 feet above sea level), Shillong (4,978), Upper Shillong (5,900), and Gangtok (5,900 feet). The subjects were all apparently in good health. They were divided into certain smaller groups on the basis of sex, race and economic status. The blood examinations were made on a single sample of venous blood taken in the morning. The data obtained included haemoglobin percentage, red cell count, white cell count, cell volume and the standard corpuscular values, reticulocyte percentage, erythrocyte sedimentation rate, and the indirect van den Bergh reaction. The results are given in tabular form ; for each sub-group the mean, maximum, minimum, standard deviation and coefficient of variance have been calculated. A table of some standard values of Indian groups living at sea level is given for comparison.

The mean haemoglobin levels of both males (16·54 gm. to 17·54 gm.) and females (14·37 gm. to 14·81 gm.) are significantly higher than those of comparable groups living at sea level. The corresponding mean corpuscular haemoglobin concentrations are also higher among the hill groups, but the red cell counts and the mean corpuscular volumes are not significantly higher. The haemoglobin percentage of the Sikkimese is higher than that of the Nepalese Gangtok ; the former eat more meat. There is no significantly higher reticulocyte percentage in any of the hill groups compared with those found in the plains.

The authors' observations confirm those of nearly all other workers on this subject, namely, that there is a significantly higher percentage of haemoglobin at higher levels, and those of the majority, namely, that this is associated with a greater concentration of the haemoglobin within the individual cell rather than to an increase in numbers of red cells or an increase in size of the individual cell. There was no evidence of an increased erythropoietic activity, as observed by Monge and his associates at very high altitudes, *e.g.*, 14,900 feet.

L. E. Napier

Mathur, K. S. **Intravenous Iron in the Treatment of Microcytic Hypochromic Anaemia.** *Indian Med. Gaz.* 1951, July, v. 86, No. 7, 289–93. [19 refs.]

The investigation was designed to test the relative values of intravenous and oral iron.

A group of 27 patients with microcytic hypochromic anaemia were selected for investigation. Ferrous sulphate was given by mouth in 5-grain doses thrice daily for 6 weeks to 10 patients, and to another group of 9 patients for 4 weeks ;

the latter group subsequently received " Uniferon ", a proprietary preparation of saccharated iron in negatively charged colloidal solution. The parenteral iron was given intravenously each day for 10 days, an initial trial dose of 2 ml. (40 mgm.) and subsequent doses of 5 ml. (100 mgm.) if there had been no reaction. A third group of 8 patients were given parenteral iron only.

In the oral group, the average increase in the erythrocyte counts and haemoglobin was 1,641 million red cells per cmm. and 5·36 gm. of haemoglobin per 100 ml. in 6 weeks ; the highest weekly increase was in the third week of treatment. Of the 17 patients receiving parenteral iron the increase of red cells and haemoglobin was 1·18 million red cells per cmm. and 5·60 gm. per 100 ml., respectively in 17 days.

Full data of the three groups are not given, but selected examples show that there was a further sharp rise in haemoglobin percentage accompanied by an increase in red cell count, mean corpuscular volume, mean corpuscular haemoglobin, and mean corpuscular haemoglobin concentration when parenteral iron was given after a 4-week course of oral iron. Two patients were refractory to parenteral iron until the underlying cause of the anaemia was corrected.

Toxic reactions were insufficient to necessitate the stopping of parenteral iron. In all, 200 injections were given ; by-effects included the following :—lumbar pain (48 cases), rigor and fever (45), fullness of head or headache (32), pain along the vein (13), pain in body, abdomen and chest (11, 6 and 5), and cough, palpitations, giddiness, flushing and sweating (3, 2, 2, 1 and 1).

The only conclusion drawn is that " Uniferon has been found to be relatively safe and effective vehicle for giving iron parenterally ". [Since full data are not given, the reader cannot supply his own conclusions regarding the comparative value of the two routes, except in the matter of rapidity of response in which parenteral iron excels.] *L. E. Napier*

Budtz-Olsen, O. E. & Woolf, C. R. **Cooley's or Mediterranean Anaemia in a Cape Coloured Family.** *South African Med. J.* 1952, Jan. 19, v. 26, No. 3, 49–51, 4 figs.

There have been two previous reports of Cooley's anaemia in Africans in South Africa [see, for example, this *Bulletin*, 1952, v. 49, 439] ; the present paper reports its occurrence in a Cape coloured family.

The father of the first affected member, the grandmother, was reputed to be a Cornishman. Of the second generation, one female was affected but of several siblings only one other was traced ; she appeared to be in good health, but was not examined. This affected woman married a Malay who was dead at the time of this enquiry. Of the third generation, 4 of 5 males were affected and 1 of 2 females.

The blood pictures of the affected persons (presumably all, but this is not made clear) showed the characteristic changes, fragmented cells, target cells, and increased osmotic resistance, and normal or increased plasma iron and iron-binding capacity. The " characteristic bone changes " were demonstrated in 4 cases. [No other clinical details are given.]

The author considers that there is no indication that the severity depends on homozygous or heterozygous transmission, but that the disease is transmitted as a Mendelian dominant. *L. E. Napier*

Vandepitte, J. M. & Pieters, G. Un cas de sickle-cell anaemia chez une jeune adulte congolaise. Possibilités du diagnostic de laboratoire. [**A Case of Sickle-Cell Anaemia in a Young Adult African in the Belgian Congo : Laboratory Diagnosis**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 281–8, 1 fig. [17 refs.]

JELLIFFE, D. B. **Sickle-Cell Disease. A Review of the Literature with a Report of Two Cases of Sickle-Cell Anaemia in Nigerian Children.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Mar., v. 46, No. 2, 169–84, 1 map & 7 figs. on 2 pls. [66 refs.]

The author starts with a review of the literature on sickle-cell disease and discusses the interrelation of sicklaemia and sickle-cell disease. He then reports two cases.

Case I.—A Hausa boy of 9 years admitted with fever, loose motions and severe pains over the tibiae. He was found to be ill-nourished, pot-bellied, anaemic and slightly icteric. His skull showed large parietal bosses. His pulse was 130 per minute and temperature 101·2°F. His liver extended to the umbilicus. There was marked clubbing of the fingers and toes. The tibiae were tender and there was a haematoma over the right tibia which was later aspirated.

The blood showed a hypochromic anaemia (haemoglobin 7·5 gm. per cent.), a leucocytosis (50,000 per cmm.), a reticulocyte count of 20 per cent. and many nucleated red cells, 70 per cent. sickling *in vivo* and almost 100 per cent. *in vitro* in 24 hours and a positive indirect van den Bergh. Liver-function tests showed material dysfunction. The radiological examination of the skull showed fine needle spicules, the typical hair-on-end effect so characteristic of Cooley's anaemia.

There was no improvement under treatment during 6 weeks and the patient remained febrile throughout.

Case II.—A Yoruba girl, aged 11 years, a clear history of previous ill-health, bouts of fever, epigastric pain, joint pains and jaundice was given. She was under-developed, pot-bellied, anaemic, icteric, and the head showed definite bilateral bossing. The liver was grossly enlarged. The fingers and toes were clubbed.

The blood showed a hypochromic anaemia (haemoglobin, 7·25 gm. per cent.), a leucocytosis (27,000 per cmm.), reticulocytes, 25 per cent., nucleated red cells, 60 per cent. *in vivo* sickling, abnormal liver function tests and a positive van den Bergh test.

The blood was checked for sickling over a period of 17 days and it was found to vary from day to day from nil to 100 per cent. sickling in 48 hours on different days ; on 5 occasions there was no sickling and on 10, 100 per cent. It also varied from hour to hour on a single day from 5 per cent. to 95 per cent. after one hour, but after 24 hours 50 per cent. was the lowest for any hour during the day.

There was no improvement under various forms of treatment in a period of 6 weeks.

The author discusses the anomaly, the relative infrequency of sickle-cell disease and high percentage of sickle-cell trait in Africans in Africa compared with African Negroes in the United States [this *Bulletin*, 1950, v. 47, 655]. He considers that the possible explanation of this is unfamiliarity with disease on the part of the relatively few doctors working in Africa and the fact that the disease is " swamped " by the other numerous acute diseases. He points out there is only one reference to sickle-cell anaemia in French literature [*ibid.*, 656] and that a standard French textbook on tropical diseases does not mention the disease [there have since been several cases reported in French West Africa and the Belgian Congo, see this *Bulletin*, 1951, v. 48, 918, 1037].

L. E. Napier

JELLIFFE, D. B. & HUMPHREYS, J. **The Sickle-Cell Trait in Western Nigeria. A Survey of 1,881 Cases in the Yoruba.** *Brit. Med. J.* 1952, Feb. 23, 405–6, 1 map. [11 refs.]

In a survey of 1,881 Yoruba Africans in Ibadan, Nigeria, the authors found an average incidence of 23·7 per cent. of the sickling trait. The subjects varied in age from new-born to older adult life. The percentage incidence of sickling was worked out for each of the eight age-groups and it was found that in the new-born (under 2 weeks of age) no sickling occurred (in 51 infants), but that among the rest there were no significant differences between age-groups.

The authors discuss their findings in relation to the anomaly of the relation of sickle-cell trait to sickle-cell disease in America and Africa ; in America the proportion is estimated at 1 in 50 and in Africa at 1 in 1,000. One possible explanation for the discrepancy, namely that in Africa, subjects with the disease die at an early age, seems to be excluded by their findings.

To explain the absence of sickling in the new-born they suggest that the persistence of foetal haemoglobin, which has an increased affinity for oxygen, may make it extremely difficult to cause the haemoglobin of the new-born to lose its oxygen, a necessary preliminary to sickling. In this connexion, they re-examined the blood of specimens of 18 new-born infants after an interval of 216 hours and found only one showing any degree of sickling, 5 per cent. in this case ; 5 specimens were haemolysed. In the general survey vaseline-ringed specimens were examined after 72 hours ; none of those from the new-born infants showed any sickling.

The authors consider that further work is necessary in the relation of foetal haemoglobin to sickle-cell haemoglobin. *L. E. Napier*

LEHMANN, H. & CUTBUSH, Marie. **Sickle-Cell Trait in Southern India.** *Brit. Med. J.* 1952, Feb. 23, 404–5.

Anthropologists speculate as to whether in prehistoric times migrations occurred to Africa from Asia. Investigations were undertaken in Southern India with the object of throwing light on this problem.

The present classification of Southern Indians into two groups, Dravidian and Pre-Dravidian is unsatisfactory since the latter group contain civilized agricultural communities such as the Badagas and tribes living under primitive conditions in the jungle such as the Irulas.

Blood samples from these aboriginal communities, from the Irulas (80 samples), from the Todas (60) and from the Badagas (191) were investigated for the sickle-cell trait (after incubation with 2 per cent. sodium metabisulphite), for blood groups in the following systems, ABO, MNS, Rh, Duffy and P, and for the detection of the He antigen.

The sickle-cell trait was found in 30 per cent. of the Irulas, in 8·4 per cent. of the Badagas, and in 3·3 per cent. of the Todas : it was not found in 443 individuals of other communities. The incidence of the Rhesus chromosome R_0 (cDe) was at the low level found in Europeans and Northern Indians rather than at the level found in Africans ; it was present in none of the Irulas, and in two each of the Todas and Badagas. None of 12 samples contained the He antigen.

The authors consider that these findings lend support to the idea of an Indian migration to Africa in prehistoric times, and are against the reverse possibility. *L. E. Napier*

Hill, F. S. & Davis, B. C. **Further Electroencephalographic Studies in Sickle Cell Anemia.** *Amer. J. Dis. Children.* 1952, Aug., v. 84, No. 2, 214–17, 2 figs.

"Electroencephalographic findings of 12 patients who had been hospitalized with signs and symptoms of sickle cell crisis are presented.

"The electroencephalograms were abnormal for all 12 of these patients, although 3 of the patients did not present symptoms possibly referable to the central nervous system.

"A finding not previously observed in the electroencephalographic patterns in earlier studies on sickle cell disease was the appearance of asymmetry of the hemispheres.

"Study of patients with sickle cell crisis by means of electroencephalography is of valuable assistance in determining the effect that pathologic changes may have on cortical function."

VENOMS AND ANTIVENENES

Pradhan, S. N. **Antihistaminics in Ophidiasis.** *Indian J. Med. Res.* 1952, Jan., v. 40, No. 1, 63–6, 4 graphs on pl.

The action of snake venoms in liberating histamine in the tissues has been known for several years, through the work of Chopra, Chowhan, Iswariah, Kellaway, Trethewie and Day [see this *Bulletin*, 1932, v. 29, 170; 1935, v. 32, 379; 1937, v. 34, 649; 1948, v. 45, 812] and it was inferred that this might, very probably, account in part at least for the toxicity of the venom. The author, arguing from this that antihistamines might have some beneficial action in snake-bite, has undertaken an investigation on the possible modification by antihistamines of the depressant action of the venom on the blood-pressure and respiration.

For his experiments he used cats, anaesthetized with urethane, and as antihistamines anthisan and phenergan. First, he injected the antihistamine before the venom, both intravenously; later, he reversed this procedure, following the venom with the antihistamine. For details of the numerous experiments the original should be consulted. The results may be summarized:

"Cobra venom in small doses . . . has been shown to cause an initial rise of blood-pressure. This initial rise is followed by a fall which may be transient or permanent. With the increase in dose, fall is more marked and permanent. On the other hand, Russell's viper venom in doses 0·025 mg. to 0·05 mg. per kg. causes a slight rise of blood-pressure followed by a gradual fall (20 mm. to 30 mm. of Hg.) returning to normal within a short time, but in doses 0·1 mg. to 0·25 mg. per kg. it causes rapid and marked fall, blood-pressure remaining permanently at a low level."

After an initial dose of phenergan the opposite of this was observed with both cobra and *Daboia* venoms, and more specifically than with adrenaline or pituitrin, hitherto used for combating the shock and collapse caused by snake venoms. Anthisan was not found to have any such action. The use of phenergan in cases of snake-bite is, therefore, worthy of further trial. *H. Harold Scott*

Flecker, H. **Irukandji Sting to North Queensland Bathers without Production of Weals but with Severe General Symptoms.** *Med. J. Australia.* 1952, July 19, v. 2, No. 3, 89–91.

"1. A description is given of Irukandji sting, caused by an unknown marine object, probably a small jellyfish.

" 2. It has been geographically recorded so far only between Rocky Point, south of the Daintree River, and Brown Bay in Trinity Bay, but probably extends both further north and further south respectively of these points.

" 3. Victims are afflicted only during the summer season, the earliest recorded case being on December 6 and the latest on February 5.

" 4. A local, small, insignificant puncture is present, accompanied by a sharp sting like that of a wasp, but this is not invariable. The absence of weals is characteristic.

" 5. There is a latent period from a couple of minutes to an hour or so, but occasionally a much longer delay occurs before the onset of severe symptoms.

" 6. Severe symptoms consist of shock with collapse, severe cramp-like pains in various groups of muscles (such as those of the back, abdominal wall, chest and limbs) not related to the site of the sting, nausea, painful retching and vomiting requiring hypodermic injections of morphine or administration of ' Trilene ' for relief.

" 7. Certain minor symptoms occur of much less importance."

DERMATOLOGY AND FUNGUS DISEASES

RODRÍGUEZ, R. El primer ensayo de la penicilina en el tratamiento del mal del pinto, efectuado en el Estado de Chiapas, el año 1948. [**First Trial of Penicillin in Mal del Pinto in the State of Chiapas in 1948**] *Higiene*. Mexico. 1952, Mar.–Apr., v. 1, No. 2, 41–8.

The preparation of penicillin used was " Flo-Cillin-96 ", obtained from the U.S.A., which was found to maintain an effective level in the circulation for 96 hours after injection. It is a suspension of crystalline procaine-penicillin G, of a strength of 300,000 units per cc. in peanut oil with 2 per cent. aluminium monostearate, equivalent to 120 mgm. of procaine base per cc., and the dosage was 4 cc. in a single administration.

Forty-two mal del pinto patients, ranging in age between 5 and 70 years, both male and female, were treated with this. All but 3 gave a positive serum reaction by the Kahn test. When seen again, one and two weeks later, a definite improvement in the discolorations was observed, more so in the more recent. Seen again, after an interval of 3 years, all were still " clinically cured ", but they could be divided into two groups : those who had presented dyschromia, localized or generalized, and those who had had vitiliginous or achromic patches. The former presented no residual signs and gave a history of cure in 2–3 months after the treatment ; the latter presented achromic patches still, but less extensive, with less defined borders and tending to contract in extent.

The author poses the question : What is the reason for persistence of the achromic patches ? He rules out penicillin-resistant clinical forms of the disease, because no patient was solely achromic and in those who had discoloured and achromic patches the former cleared while the latter persisted and he concludes that the vitiligo patches resistant to treatment are a sequela of a trophic nature in which the treponema no longer plays a part. He intends to study this aspect further, and if the treponema is no longer demonstrable the absence should be regarded as evidence of bacteriological cure. Examination of the serological reactions of 22 of the patients before treatment and 3 years after it revealed strange differences in 7 of them. Five who had given a 4-plus Kahn before gave a 3-plus after ; one who had given a 1-plus became a 3-plus, and one who had been negative became 1-plus.

The author concludes that procaine-penicillin is harmless, gives more satisfactory results than the bismuth and arsenical preparations hitherto used, and that, as a single administration suffices, it is ideal for mass treatment in the field, especially among the poor, the illiterate and where general hygiene is of a low order and overcrowding and promiscuity are common, where the people are well acquainted with the disease, regard it with indifference and will not submit to prolonged treatment in any form. *H. Harold Scott*

Guimarães, F. N. Infecção do Hamster (*Cricetus auratus* Waterhouse) pelo agente da micose de Lutz (blastomicose sul-americana). Nota preliminar. [**Experimental Transmission of South American Blastomycosis to Hamster**] *Hospital.* Rio de Janeiro. 1951, Oct., v. 40, No. 4, 515–20, 2 figs.

The English summary appended to the paper is as follows :—

" Five of 6 Hamsters (*Cricetus auratus* Waterhouse) inoculated with material from an oral lesion of a case of South-American blastomycosis (Lutz's disease), presented extensive lesions in the internal organs, with numerous fungi. In the guinea-pig—admitted by several authors as the selected animal for inoculation with the agent of this disease—lesions are usually localized in the injected testes and sometimes also in the satellite inguinal lymph node. The writer emphasizes the importance of the hamsters as the choice animal for pathogenic and therapeutical studies in South-American blastomycosis, since it shows visceral lesions similar to those exhibited by human cases of the disease in the liver, spleen, intestine, lymph nodes and lungs."

Shoucair, E. S., Gordon, C. C., Grant, L. S. & Hill, K. R **Chromoblastomycosis in Jamaica. A Case Report.** *West Indian Med. J.* 1952, Apr., v. 1, No. 2, 211–15, 7 figs. on 2 pls.

Report of a case.

TROPICAL ULCER

Indian Med. Gaz. 1951, Dec., v. 86, No. 12, 568–74, 8 figs. on 4 pls. **Symposium on Naga Sore.** [Sanyal, N. (**Epidemiology**) ; Chaudhuri, R. N. (**Clinical Features**) ; Das Gupta, C. R. (**Haematological Studies**) ; Bhattacharjee, B. (**Histopathology**) ; Ghosal, S. C. (**Bacteriological Observation**) ; Sen, S. C. (**Protozoological Investigations**) ; Panja, D. (**Treatment**) ; Sodeman, W. A., Lahiri, M. N. & Panja, G. (**Discussion**).]

An " outbreak " of naga sore (ulcus tropicum) was reported from a village in Nadia district of Bengal by a local practitioner ; two doctors were therefore sent from the Calcutta School of Tropical Medicine to investigate the circumstances of this outbreak. Eleven patients were brought down to the School's hospital for treatment and investigation. A symposium on naga sore was arranged and held at the School.

Dr. N. Sanyal reported on the epidemiology. Out of a total of 73 families, 56 with a total of 306 members had cases of naga sore. The distribution was as follows : 35 families had one case, 18 had two cases, 2 had three cases and 1 had four cases. [This appears to be a " normal " distribution and is against man-to-man infection.] The patients were cultivators, mostly undernourished

(as many were refugees) ; the sores were all on or below the knee, and 90 per cent. started at the site of a minor injury, the rest at that of an insect bite.

Dr. R. N. Chaudhuri reported on the clinical findings. Seven patients had a single ulcer, 3 had two ulcers and 1 had six. The ulcers varied from half an inch in diameter to 5 inches by 4 inches ; they were usually round ; the margins were raised above the skin level ; the bases were covered with a slough and there was a sero-purulent discharge ; in 4 cases there was oedema of the surrounding tissues ; and in most cases the lesions were painful.

Dr. C. R. Das Gupta reported on the blood pictures. There was slight or moderate anaemia in all but one case ; in 4 there was macrocytosis, the remainder being normocytic ; the total blood proteins were low in the 8 patients tested and in 5 there was an increase in globulin ; and the corrected erythrocyte sedimentation rate was high in 9 cases, 32 to 60 mm. in one hour.

Dr. B. Bhattacharjee describes the histopathology. There are 4 distinct layers at the base of the ulcer : an upper necrotic layer separated by a pallisade of fusiform bacilli from the next layer of unhealthy granulation tissue, below which is a layer of healthy granulation tissue, and finally a layer of increased vascularity, scantily infiltrated by lymphocytes, plasma cells and neutrophiles with numerous fibroblasts.

Bacteriological investigations were reported by Dr. S. C. Ghosal. He found fusiform bacilli in 9 cases, the other two patients having received treatment : cocci were also present in all cases and diphtheroids in 4. In 5 out of 7 cases Dr. S. C. Sen found *Treponema vincenti*.

Dr. D. Panja discussed the treatment. He summarizes the hospital treatment as follows : rest in bed, good food, removal of sloughs by antiseptic evaporating lotions, penicillin injections (100,000 units every 8 hours for 7 to 10 days), the avoidance of greasy dressings until the lesion is perfectly clean and finally 1 to 2 per cent. boric lotion applications when the ulcer is healing.

Terramycin was used with a poor result. In the discussion Dr. M. N. Lahiri stated that he had isolated 10 strains of fusiform bacilli when investigating the disease in Assam : he used a 20 per cent. blood agar made with trypsin broth. Dr. G. Panja stated that he had produced the sores experimentally in volunteers by injecting pure cultures of the fusiform bacillus. In his opinion it was the specific cause of naga sore. *L. E. Napier*

Das, K. N. **Prevalence of Tropical Ulcer (Naga Sore) at Sagurnal Tea Estate, Sylhet.** *Indian Med. Gaz.* 1952, July, v. 87, No. 7, 292–5, 1 chart & 1 fig. on pl.

Moustardier, G. Considérations actuelles sur la pathogénie et le traitement de l'ulcère phagédénique des pays chauds. [**Present Position of the Pathogenesis and Treatment of Tropical Ulcer**] *Rev. Paludisme et Méd. Trop.* 1952, June 15, v. 10, No. 96, 117–32. [35 refs.]

PROTOZOOLOGY : GENERAL

Winsser, J. Die Toxoplasmose. [**Toxoplasmosis**] *Ergebn. Hyg. Bakt. Immunitätsf.* 1952, v. 27, 1–93, 2 figs. [Numerous refs.]

Wysocka, F., Kozar, Z. & Sikorska, S. **Four Cases of Congenital Toxoplasmosis in Gdańsk.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1952, v. 4, No. 2, 203–7. [Also in Polish 191–7 & Russian 197–203.]

Neghme, A., Thiermann, Erica, Pino, F., Christen, R. & Agosin, M. Toxoplasmosis humana en Chile (Comunicación preliminar.) [**Human Toxoplasmosis in Chile. A Preliminary Note**] *Bol. Informaciones Parasitarias Chilenas.* 1952, Jan.–Mar., v. 7, No. 1, 6–8.

The English summary appended to the paper is as follows :—

" The parasitologic investigation of 85 placentas from cases suspected of toxoplasmosis, revealed the parasite in two of them. The study was negative in 16 foetus, in 1 hepatic biopsy and in 9 specimen of spinal fluid and blood. The second human case discovered is discussed. The importance of the demonstration of the parasite is emphasized as fundamental for the diagnosis of this infection."

Mellgren, J., Alm, L. & Kjessler, Å. **The Isolation of Toxoplasma from the Human Placenta and Uterus.** *Acta Path. et Microb. Scandinavica.* 1952, v. 30, No. 1, 59–67, 8 figs. [21 refs.]

" Toxoplasma placentitis of a 30-year-old woman was diagnosed pathologic-anatomically. On two occasions Toxoplasma was isolated from her vaginal discharge. The patient immediately after parturition had a high Toxoplasma-neutralizing titer, which decreased steadily during one year's observation.—The mode of Toxoplasma infection of the foetus in apparently healthy mothers was discussed."

von Zeipel, G. & Linder, L. A. **Toxoplasmosis. A Serological Investigation with Dye Test.** *Acta Path. et Microb. Scandinavica.* 1951, v. 29, No. 3, 229–38.

" In a comparative study the dye test proved superior to the egg neutralization test, which must be regarded rather as a qualitative reaction. Complement fixation gives a good idea of the antibody content of the serum, but it is less sensitive than the dye test. Nonspecific reactions may occur both in the egg neutralisation and in the complement fixation. Sera from altogether 1923 persons were examined by the dye test. Of the sera from mainly male blood donors about 37 per cent gave a positive reaction in the dilution 1 : 10. Of the sera from pregnant women of corresponding age distribution 49 per cent gave a positive reaction in this dilution. In 84 cases the dye test gave a positive reaction with serum dilutions of 1 : 250 or higher. Of these persons 19 were clinically healthy. The remainder had varying symptoms : these symptoms are summarized. As the antibody titer can be significantly increased for a long time after inapparent as well as after manifest toxoplasmosis there was probably often no connection between the disease in question and the demonstrated antibodies against toxoplasmosis. The diagnostically important, rising phase of the antibody curve probably runs a steep course in most cases and was observed in the present series in only 1 healthy pregnant woman, in 1 case of encephalitis and in 1 case of lymphadenitis and in 1 case of fever of unknown cause. A relatively large number of patients had enlarged lymph nodes, with or without fever. The histopathological examination showed in 9 of these cases a non-specific lymphadenitis. Attempts to transmit the disease to mice by the inoculation of lymph node material from 3 of the patients failed."

Murphy, W. F. & Flannery, J. L. **Congenital Toxoplasmosis occurring in Identical Twins.** *Amer. J. Dis. Children.* 1952, Aug., v. 84, No. 2, 223–6, 1 fig.

Siim, J. C. **Studies on Acquired Toxoplasmosis II. Report of a Case with Pathological Changes in a Lymph Node removed at Biopsy.** *Acta Path. et Microb. Scandinavica.* 1952, v. 30, No. 1, 104–8, 2 figs.

"(1) A new case of acquired toxoplasmosis with generalized lymphadenopathy is reported, in which the serological reactions showed a significant rise of the titer during the acute phase of the disease and where the thymol turbidity test was positive.

"(2) The microscopical examination of a lymph node shows a pronounced hyperplasia of the reticulum cells with several mitoses, and with changes possibly due to a chromatolysis."

Cross, Joy B. **Diasone, Avlosulfon and Sulphetrone as Therapeutic Agents in Experimental Toxoplasmosis.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 593–7. [12 refs.]

In an earlier investigation it was reported by the author [this *Bulletin*, 1951, v. 48, 837] that diasone and promin could successfully abolish the carrier state in mice with experimental toxoplasmosis. It was then found that the treatment with diasone was more effective and less toxic than with promin and the former has now been used as a standard of comparison for 2 other sulphones, sulphetrone and Avlosulfon. It was found that 0·5 per cent. diasone and 0·1 per cent. Avlosulfon when administered in the diet, protected mice from certain death even when treatment was delayed for $\frac{1}{3}$ of the survival time of control animals. Sulphetrone up to 3 per cent. had only a slight protective effect. The method of drug administration, namely continuous dosage followed by intermittent dosage, is thought to have contributed to the elimination of the carrier state in 7 and possibly 10 out of 11 cases investigated.

J. D. Fulton

Grassi, C. & Kåss, E. **Failure of Terramycin Treatment in Acute Experimental Toxoplasmosis.** *Acta Path. et Microb. Scandinavica.* 1952, v. 30, Nos. 3/4, 304–5.

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Boettiger, E. G. & Furshpan, E. **The Recording of Flight Movements in Insects.** *Science.* 1952, July 18, v. 116, 60–61, 1 fig.

Kitzmiller, J. B. **Inbred Strains of *Culex* Mosquitoes.** *Science.* 1952, July 18, v. 116, 66–7.

Reid, J. A., assisted by A. Ganapathipillai. **Experiments on the Mode of Action of Oils and of DDT as Mosquito Larvicides.** *Bull. Inst. Med. Res. Fed. Malaya.* 1951, n.s. No. 4, 1–28, 5 figs. (2 on 2 pls.). [33 refs.]

During the post-war period in Malaya new blends of oils for mosquito larviciding became available but little was known of their effectiveness. Five per cent. DDT in kerosene did not always give adequate control of

Anopheline larvae in the field and in several cases it was replaced by heavy oiling. The most important qualities for a good larvicide are discussed in this paper.

In laboratory experiments, 5 per cent. DDT in Malariol as a thin film (0·3 μ) had little effect on larvae of *Anopheles vagus*. If larvae were exposed to this film for 10 minutes, and then transferred to clean water, the kill after 24 hours was only 4 per cent., yet a similar exposure to a film of oil alone (7 μ thick) gave 80 per cent. kill after 24 hours. Observations made on larvae of *A. vagus* placed in bowls of clean water with DDT oil films coloured with Sudan III suggest that the DDT acts largely as a stomach poison.

If oil alone is used as a larvicide the degree of penetration of the oil into the trachea is important ; when penetration as far as the first abdominal spiracle occurs the larvae almost invariably die. The degree of penetration depends largely on the viscosity of the oil, being greater with oils having a low viscosity. With short exposures (1 to 5 minutes) kerosene penetrates more effectively than gas oil, and gas oil than diesel oil. An increase in the exposure time to 5 to 10 minutes gave little or no increase in effect. Similar experiments with *Culex fatigans* show that as with *A. vagus* partial penetration of the trachea by oil only gives a small percentage kill.

After penetration the toxic power of the oil is important. Malariol used in Malaya just after the war was not as toxic as that used before the war ; this was due not only to the lower viscosity and greater penetrative power of the pre-war oil but also to its greater toxicity.

Low concentrations of DDT added to Malariol did not enhance the killing power of the oil, since the amount of oil taken in by larvae to give a lethal dose was sufficient to kill without the addition of an insecticide. To enhance the killing power of Malariol in laboratory tests it is necessary to add not less than 1 per cent. DDT.

On flowing water an oil must penetrate the trachea of the larva to be a good larvicide. Experiments in a ravine in the Kuala Lumpur area where *A. maculatus* was known to breed proved that in practice a film of oil in rapidly moving water may remain more than 1 μ thick, *i.e.*, at an effective thickness for approximately 15 minutes to 2 hours after spraying. Although the effectiveness of an anti-malarial oil is usually measured by its ability to kill larvae, an oil may also act as a repellent to the adult female mosquitoes and thus delay egg laying in an area.

There is a correlation between spreading pressure and covering power of oils. Oils vary considerably in their covering power, for instance, diesel oil covered 7 times the area covered by gas oil or kerosene. Gas oil and kerosene would therefore appear to be unsuitable as carriers for DDT.

It is suggested that an oil is required which is light enough to have a low viscosity but at the same time has a high spreading pressure. This may be obtained by mixing heavy, medium and light oils.

C. M. Harrison

American J. Trop. Med. & Hyg. 1952, May, v. 1, No. 3, 369–411. **Panel Papers on Resistance of Insects to Insecticides** [i] **Introduction** (Simmons, S. W.) 369–70 ; [ii] **The Significance of Insecticide Resistance in Vector Control Programs** (Hess, A. D.) 371–88, 95 refs. ; [iii] **Present Status of Mosquito Resistance to Insecticides** (Knipling, E. F.) 389–94, 12 refs. ; [iv] **House Fly Resistance to Chemicals** (Decker, G. C. & Bruce, W. N.) 395–403, 2 figs. ; [v] **The Current Status of Physiological Studies on DDT Resistance** (Chadwick, L. E.) 404–11, 45 refs.

(i) Any hope of the complete eradication of many disease-carrying insects has had to be abandoned in the last few years because of the development of

insect resistance to insecticides. In introducing the speakers presenting this series of papers, Simmons points out that the present chaos caused by the failure of insecticides can be attributed very largely to the short-sighted policy followed in the last few years. Little fundamental research on insect physiology and toxicology has been done, and only now is the need for the approach to the problem being recognized.

(ii) Hess recognizes the following three major types of resistance to an insecticide ; physiological, morphological, in which some peculiarity of structure is responsible for resistance, and behaviouristic in which the insect has changed its normal behaviour pattern and may rest more frequently on surfaces which are unlikely to be treated, or may move more slowly so that the dose of insecticide picked up is less than would normally be the case.

The current position of insecticide resistance in various countries is discussed. DDT-resistant house-flies are very widespread and occur in countries as far apart as Greece, Sweden, Australia, South America and the United States. Insects other than house-flies have also become DDT-resistant but are not yet so widespread. DDT-resistant lice occur in Korea, DDT-resistant fleas in Greece and South America, and there are a number of cases of Culicine mosquitoes showing a resistance to DDT, particularly in the United States.

The rate of development of resistance varies from one case to another, but in the house-fly resistance has occurred in many instances after 2 to 3 years of use of the insecticide. Once resistance to DDT has been obtained, resistance to other chlorinated hydrocarbons may follow readily and many strains show multiple resistance. With salt-marsh mosquitoes resistance has usually appeared after approximately 6 seasons of use of DDT.

House-fly strains which have become resistant to two or more chlorinated hydrocarbons are usually resistant to other chlorinated hydrocarbons without previous exposure to them, but they are not usually resistant to unrelated compounds such as pyrethrin, allethrin and parathion.

Most field strains tend to lose their resistance gradually when taken into the laboratory. In the field this does not appear to be so, possibly because the insects are frequently coming into contact with sublethal residual deposits. The intensive use of insecticides in the field favours the development of resistance, and when both the adult and larval stages are treated with insecticide a high degree of resistance is obtained rapidly.

Reports on the differences in the length of life cycle between resistant and normal flies are conflicting. In some cases the larval period is longer in resistant strains, and adults of these strains are also able to withstand greater extremes of temperature.

The necessity of controlling flies by permanent measures, such as the prevention of breeding, is emphasized, but the author suggests that a combination of natural control measures and the judicious use of insecticides in the form of space sprays may prove most satisfactory. A return to fundamental research on insect physiology and toxicology is essential.

(iii) Resistance to DDT in mosquitoes, discussed by Knipling, was first noticed in 1947 in Italy where DDT failed to control *Culex pipiens autogenicus* adequately. In 1949 in Florida both larvae and adults of the salt-marsh mosquitoes *Aëdes taeniorhynchus* and *Aëdes sollicitans* were 10 times more resistant to DDT than mosquitoes of the same species taken from untreated areas. In general, however, the degree of resistance attained among Culicine mosquitoes is not of such a high degree as with the house-fly. Other Culicine mosquitoes which have become DDT-resistant in certain localized areas of the United States are *Aëdes nigromaculis*, *A. dorsalis*, and *Culex tarsalis*. *A. taeniorhynchus* and *A. sollicitans* also proved to be resistant to TDE (DDD) and after the use of gamma BHC to this also. *Culex tarsalis* larvae which were DDT-resistant in one

particular area were slightly resistant to toxaphene, lindane, aldrin and heptachlor.

As with house-flies it appears that the intensive use of DDT against both larval and adult Culicines leads to a more rapid appearance of resistance than when only one stage of the life cycle is exposed to the insecticide.

There is no clear indication of resistance among Anopheline mosquitoes in natural populations, but there is also no reason to suppose that resistance cannot arise among Anopheline mosquitoes.

The importance of environmental control of mosquito larvae by drainage or other methods is emphasized, but the author considers that the search for new insecticides against mosquitoes should be continued and that an investigation of synergists which would nullify resistance may prove worth while.

(iv) Resistance by house-flies was first noticed in Europe in 1949 after DDT had been in commercial use since 1944. Decker and Bruce trace the development of resistance in Europe and point out that the course of development was similar in the United States but it followed a year later.

In Illinois DDT was in general use in 1945. Resistance developed slowly at first between 1945 and 1948, but by 1949, 91 per cent. of the samples of flies collected from farms were DDT-resistant. Farmers turned to using other insecticides but resistance to these followed. In general, exposure to DDT over 6 to 20 generations gives a significant degree of resistance and exposure for more generations leads to a very rapid rise in the degree of resistance.

Tolerance for one chemical appears to predispose a strain of flies to a very rapid development of resistance to other chemicals. Flies having a high DDT-resistance readily acquire a resistance to methoxychlor but have only a slight resistance to lindane, chlordane, and dieldrin. Resistance to chlordane usually carries a moderate degree of resistance to lindane and dieldrin.

The variable results obtained by different workers on different strains point to the joint action of many independent characters of resistance.

(v) In this excellent review of the physiology of DDT-resistance Chadwick suggests that in order to plan control measures which will deal adequately with resistant insects as well as prevent a recurrence of the problem it is necessary to discover not only the precise mechanism of resistance to a toxicant but also the mechanism of intoxication.

DDT obviously affects the nervous system and makes sensory cells and nerve fibres abnormally excitable. The increase in muscular activity which accompanies DDT poisoning is interpreted as a reflex result of the nervous discharge. The increase in the respiratory rate also seems to be secondary, resulting from the extra muscular activity. One theory proposed that death was due to the depletion of essential foodstuffs owing to the abnormal activity, but this was not substantiated since the injection of energy-rich substrates failed to increase the survival of poisoned insects. Although it has been suggested that death in an insect poisoned by DDT may be due to the accumulation of toxic metabolites and an increase in the lactic acid and ketone bodies, the accumulation of these substances may in fact be a result of the increased activity. The effect of DDT on an enzyme mechanism is again confusing. DDT has been demonstrated to inhibit the activity of cytochrome oxide partially *in vitro* and in poisoned flies, but there is no definite proof that this is a significant factor in the mechanism of intoxication.

The physiological nature of DDT resistance is unknown but there are a number of differences between DDT-resistant and normal flies. Resistant flies are capable of converting DDT to the non-toxic compound DDE apparently by enzymes, but DDT-resistant flies may still contain enough DDT to kill several normal flies and yet show no sign of poisoning themselves. Adults of

one resistant strain were found to have more cytochrome oxidase than a normal strain. It is suggested that if in DDT poisoning there is an inhibition of cytochrome oxidase the resistant flies would be capable of withstanding greater doses of DDT than normal flies, but this is not completely proved. Since oxidative metabolism reactions may be involved in the conversion of DDT to DDE the detoxification process and the oxidation-reduction system of which cytochrome oxidase is a part may be linked. Only a knowledge of all the mechanisms concerned in the action of insecticides and in resistance will give a basis for an efficient control programme. *C. M. Harrison*

Buck, J. B. & Keister, Margaret L. **Respiration and Water Loss in the Adult Blowfly, *Phormia regina*, and their relation to the Physiological Action of DDT.** Reprinted from *Biol. Bull.* 1949, Aug., v. 97, No. 1, 64–81, 9 figs. [14 refs.]

It is known that one of the effects of DDT upon flies is to increase the loss of water and the consumption of oxygen. The authors used this as a tool for physiological studies on respiration, loss of water and so forth, working with the adult blowfly (*Phormia*). Individuals of known age were poisoned by walking over a layer of DDT left in the microcrystalline state after evaporation from ether on a glass surface. Many of the experiments were carried out either in approximately dry air (in equilibrium with solid sodium hydroxide) or in air which was much moister (in equilibrium with a 10 per cent. water solution of the same salt).

The authors concluded among other things that flies poisoned with DDT lose more weight than controls both in dry and wet air. The loss of weight is approximately linear for many hours. Even in moist air, loss of water forms about 60 per cent. of the total, the figure being of course higher in dry air. The greatest part of the loss of water is through the spiracles. Loss of water is not the primary cause of death. *P. A. Buxton*

Hopkins, G. H. E. & Clay, Theresa. **A Check List of the Genera and Species of Mallophaga.** 362 pp. 1952. London : British Museum (Natural History), Cromwell Road, S.W. 7, B. Quaritch, Ltd. & H.M. Stationery Office. [40*s.*]

Ryckman, R. E. & Halstead, B. W. **Report of a Case of Human Nasal Myiasis by the Greenbottle Fly, *Phaenicia sericata*, in San Bernardino County, California.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 711–12.

Jamnback, H. **The Importance of Correct Timing of Larval Treatments to control Specific Blackflies** (*Simuliidae*). *Mosquito News.* 1952, June, v. 12, No. 2, 77–8.

The experiences related in this paper emphasize once again the importance of obtaining a knowledge of the insect species present in an area and of their biology before applying control measures. In the Adirondack region of New York there are more than 17 species of blackflies. Only 3 annoy man ; one, *Prosimulium hirtipes* overwinters in the larval stage, pupating in late April and early May. The other two, *Simulium venustum* and *Simulium tuberosum* overwinter in the egg state, larvae appearing in late May. It was only after the failure of certain control measures that the above facts were learned and it was realized that to be effective it would be necessary to revise the control programme.

The treatment was by DDT-impregnated plaster of paris blocks, placed in the streams containing blackfly larvae ; the dosages of 0·0005 to 0·001 p.p.m. for 24 hours had very little effect on the populations of other aquatic arthropods. But, instead of merely treating the streams once, hoping to reduce the blackfly population in general, by treating the streams twice, at the times when, respectively, the two annoying groups of blackflies were in the larval stage, it was found that the streams remained free of larvae of the annoying species until June 20th or later. The number of annoying adults emerging was reduced almost to zero. *H. S. Leeson*

Sternburg, J. & Kearns, C. W. **The Presence of Toxins other than DDT in the Blood of DDT-Poisoned Roaches.** *Science.* 1952, Aug. 8, 144–7, 1 fig.

It has been reported that the blood of cockroaches, prostrate from DDT poisoning, contains DDT and that this may be demonstrated by injection of the blood into flies.

In repeating this experiment, but using micro-chemical methods, the present authors confirm the presence of DDT in the blood of poisoned cockroaches. But they find little correlation between the chemical result and the toxicity of the blood to insects (blood containing 1 or 10 parts per million of DDT being similar in toxic effects) : moreover the blood is about equally toxic, by injection, to normal and DDT-resistant flies. They also show that blood from poisoned cockroaches produces electrical responses in the isolated insect nervous system, which could not be attributed to DDT. A toxic substance other than DDT is clearly present and responsible for some at least of the effects observed. *P. A. Buxton*

Symes, C. B. **Some Recent Progress in the Study of Insecticides and their Application for the Control of Vectors of Disease.** *J. Roy. San. Inst.* 1952, Sept., v. 72, No. 5, 498–512. [69 refs.] Discussion 512–14.

This is a review of a large body of literature, and an important exposition of present-day methods and opinions, and of problems still awaiting solution. The author deals with mosquitoes, house-flies, tsetse flies, *Simulium*, sandflies, fleas, lice, ticks and the equipment for applying insecticides. This is a useful paper on a subject now moving so fast that it needs critical classification of this kind for the expert and the general tropical administrator alike.

Charles Wilcocks

Kirchberg, E. Die gegenwärtige Insektizidsituation in den USA. (Ergebnisse einer Studienreise 1951.) [**The Present Position of Insecticides in the United States : Results of a Study Tour, 1951**] *Schädlingsbekämpf.* 1952, Feb.–Mar., v. 44, Nos. 2/3, 21–30. [Numerous refs.]

Maes, H. **Phosphorus as a Factor preventing DDT-Dehydrochlorination.** [Correspondence.] *Nature.* 1952, Aug. 23, v. 170, 328.

Dehydrochlorination of DDT by certain chemicals is important, and has been shown to be related, in studies on the walls of African houses, to the presence of iron and aluminium ions. In soils causing rapid dehydrochlorination there are ferric ions, but few ferrous ions, and occasional slight traces of phosphate ; in soils which do not have this effect, both ferric and ferrous ions are found, and there is always some phosphate. It seemed possible that phosphate could neutralize ferric ions, and laboratory experiments showed

that treatment of soil with phosphates greatly reduced the power to dehydrochlorinize DDT. The insecticidal action of DDT sprayed on walls is almost always prolonged by previous spraying with a normal solution of a phosphate.

Charles Wilcocks

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

FAIRLEY, N. H. **Chemotherapeutic Advances in Tropical Diseases of Importance to Australia.** *Med. J. Australia.* 1952, May 10, v. 1, No. 19, 625–33. [65 refs.]

This is the Mathison Memorial Lecture, delivered at the University of Melbourne, November 12, 1951.

Diseases are grouped according to their causative agents and among the virus infections lymphogranuloma venereum and trachoma, it is stated, respond to full courses of aureomycin, chloramphenicol or terramycin, while in pneumonias caused by viruses and in smallpox these antibiotics may eliminate secondary bacterial infection.

The author reviews briefly the various rickettsial diseases and their therapy and prophylaxis, with special reference to the newer antibiotics. Of the bacterial diseases bacillary dysentery, the enteric fevers and brucellosis and leprosy are discussed.

In the first World War the mortality from bacillary dysentery on Gallipoli varied from 2·7 to 5·0 per cent. and the average stay in hospital was 75 days. For the last 10,000 cases in New Guinea during the second World War it was 0·5 per 1,000 and convalescence was greatly shortened. During the war British and Australian workers preferred sulphaguanidine, whereas the Americans employed sulphadiazine. Sulphadiazine, sulphamerazine, sulphamethazine and sulphathiazole, with the possible exception of sulphamethazine, may produce renal blockage and anuria in dehydrated patients. Chloramphenicol, aureomycin and terramycin all appear to be effective in bacillary dysentery, though they are more expensive than the sulphonamides. These antibiotics may, however, ultimately prove useful in the elimination of carriers resistant to other drugs.

The treatment of the typhoid and paratyphoid fevers with chloramphenicol is discussed at some length and in relation to relapse, complications, carriers and mortality. Of leprosy it is stated that though the ideal drug has not yet been discovered, the sulphones are a great advance on previous forms of treatment. Their greatest value is in lepromatous leprosy in which nodular lesions disappear and complications, such as blindness and laryngeal stenosis, are avoided. After some years of treatment there is a reasonable prospect of a leprosy patient being rendered bacteriologically "sterile" and of returning home as an ordinary member of society.

In leptospirosis which has a general case mortality of 20 per cent., penicillin has not lowered the death rate—a surprising fact in view of the clinical improvement it brings about. The probable cause of this anomaly is that it has not been given in sufficiently large doses during the first four or five days when leptospires are still in the blood-stream and when irreversible damage has not been done to the various tissues. It is possible that aureomycin may prove to be the antibiotic of choice in leptospiral infections, though no conclusions can be drawn from the small number of cases so far treated.

Regarding intestinal amoebiasis, treatment with penicillin and sulphonamides has proved disappointing. Chloramphenicol is ineffective in this infection,

terramycin and aureomycin produce a cure but many patients relapse later. The major action of these antibiotics is probably on the associated bacteria rather than on *Entamoeba histolytica* itself.

In metastatic amoebiasis chloroquine is of value. It is selectively stored in the liver where it reaches a concentration several hundred times greater than that in the blood plasma. In large liver abscesses, however, aspiration is still advisable and when secondary bacterial infection has occurred, incision and drainage remain necessary, despite combined aureomycin and chloroquine therapy. Chloroquine generally fails to eradicate *E. histolytica* from the gut owing to the low concentration of drug attained there. It is always advisable to follow chloroquine therapy with a course of emetine-bismuth-iodide or other specific treatment designed to eradicate the intestinal infection.

In infections with *Wuchereria bancrofti*, hetrazan (Banocide) is effective against the microfilariae and probably also against the adult worms. In infections with *Loa loa* the drug is certainly effective against both adults and microfilariae. The standard dosage is 2 mgm. drug per kgm. of body weight, given thrice daily by mouth for three weeks.

For the treatment of schistosomiasis, sodium antimony tartrate given intravenously remains the sheet anchor. Unless otherwise contra-indicated, a total course of 30 grains should be given, and it seems advisable to give the drug daily rather than at intervals of two days. Fouadin (stibophen) and Anthiomaline are other trivalent antimony drugs, and may be given intramuscularly ; they are therefore convenient to use in the treatment of children. Miracil D exerts a therapeutic effect when administered orally to patients with schistosomiasis and is the first drug known to be active when given by this route. The percentage of radical cures resulting has, however, not yet been determined. Unfortunately, miracil D, though not excessively toxic, is a severe gastro-intestinal irritant and unless this disadvantage can be overcome, it will never become a popular drug for mass treatment. *A. W. Woodruff*

GOODWIN, L. G. **The Chemotherapy of Tropical Diseases. Part II. Diseases caused by Rickettsiae, Bacteria, Spirochaetes and Worms.** *J. Pharmacy & Pharmacol.* London. 1952, Sept., v. 4, No. 9, 601–14. [199 refs.]

A full review, see this *Bulletin*, 1952, v. 49, 554.

PRIDIE, E. D. **Some Health Aspects of Agricultural Development and Welfare Schemes in Rural Africa.** *J. Roy. San. Inst.* 1952, Sept., v. 72, No. 5, 495–7.

For his presidential address to the Section of Tropical Hygiene at the Health Congress of the Royal Sanitary Institute, 1952, Dr. Pridie chose a non-controversial subject, and spoke on the health aspects of agricultural development and welfare schemes in Africa. The two great examples of the need for this kind of foresight are the spread of schistosomiasis, and the creation of breeding places for anophelines, as a result of construction of perennial irrigation canals. He referred to the standard of housing and of medical care for the communities concerned, mentioning particularly the rural health centres, usually of a simple type, at which medical attention can be given and which can act as medical intelligence centres. *Charles Wilcocks*

BOOK REVIEW

GILLMAN, Joseph [D.Sc., M.B., B.Ch.] & GILLMAN, Theodore [M.Sc., M.B., B.Ch.]. **Perspectives in Human Malnutrition. A Contribution to the Biology of Disease from a Clinical and Pathological Study of Chronic Malnutrition and Pellagra in the African.** pp. xxi+584, 259 figs. & 3 charts. 1951. New York : Grune & Stratton, Inc., 381 Fourth Avenue. [£7 4s.]

In this large volume there are really two books which have become intimately mixed and somewhat confused in the writing. Firstly, two experienced and capable observers have described the clinical and pathological findings in the variety of types of nutritional diseases occurring among the Africans of Johannesburg. Here both the text and the illustrations are models of accurate recording of precise detail. As in other countries, disorders of nutrition in South Africa affect most conspicuously skin and liver. Six chapters are devoted to diseases of each of these organs. These chapters will become a standard reference for both clinicians and pathologists.

Secondly, there are the theoretical expositions which are dispersed around and within the factual writing. The Gillman brothers appear never happier than when, armed with an awkward fact, they are charging at established nutritional theory and destroying present-day orthodoxies. As they are always well informed, the battles are both instructive and entertaining for the experienced reader. Unfortunately they usually leave the field in chaos with all their ninepins knocked down. So the novice will certainly not find " perspectives " here. For example, the statement " there is a vast difference between the chemical analysis of a food and its biological usefulness " is put in italics and supported by a long list of proven discrepancies. Food analysis tables appear utterly discredited. The reader is left with the impression that they are of little practical use. The many, many occasions when chemists and biologists would agree about the nutritive value of a food receive scant notice. The discrepancies are important and worthy of study, but their over-emphasis can produce chaos in the approach to practical problems of prevention and therapy. Food analysis tables are still practical medicine.

In fairness it must be made clear that the variety and multiplicity of nutritional diseases in Johannesburg increase the difficulties of definition and classification. In many parts of Africa pellagra, kwashiorkor and famine oedema appear to be intimately associated. These are gross deficiencies of many essential nutrients and a complete lack of balance in the customary foods of many of the peoples. The separation and classification of the resultant biological sequences present unique difficulties. Cause and effect are often and inevitably confused. However, the book's accurate and factual descriptions, as well as the somewhat anarchic theories, can both be recommended to the expert. Let us hope that in time the Gillmans find clearer " perspectives " providing simpler and practical approaches to the problems of African nutrition. When they do, could their publishers be persuaded to abandon the narrow double columns of type, which are very tiring to the eye, and also to produce a book at a price within the capacity of British purses ? Finally both authors and publishers must be congratulated on the many fine illustrations, beautifully reproduced.

R. Passmore

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Am.	signifies	Amoebiasis and Intestinal Protozoal Infections.
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Bl.	„	Blackwater Fever.
B.R.	„	Book Review.
Chl.	„	Cholera.
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Baussay, J., 853 (Typh.)

Bautista, A. P., with Salcedo, Regala, Pascual, Santiago, Intengan, Bocobo, & Concepcion (75) (Def. Dis.)
Baylet, R., 515 (Ys.)
——, with Monnet, 248, 604, 605, (605) (Tryp.)
——, with —— & Reynaud, 1030 (Tryp.)
Baylon, H., Bloch, F., Giroud, P. & Coumel, H., 613 (Typh.)
Beadle, L. C., with Hobson & Stephenson, (707) (Hel.)
Bean, W. B., Franklin, M. & Daum, K., 298 (Def. Dis.)
Bearup, A. J., with Backhouse, 417, 977 (Hel.)
Beauchesne, R., with André & Montauffier, (1037) (Typh.)
Beautyman, W. & Woolf, A. L., 529 (Hel.)
Beaver, P. C., 885 (Hel.)
—— & Sodeman, W. A., 884 (Hel.)
Bechelli, L. M. & Rotberg, A., 1089 (B.R.)
——, with ——, (412) (Lep.)
Beck, J. W., 421 (Hel.)
Becker, B. J. P. & Jacobson, S., 161, 419 (Hel.)
Becker, H. W. & Kaether, H., (763) (Typh.)
Becla, E., with Kryński & Kuchta, 680, 763 (Typh.)
Behar, A., with Wolman, 1111 (Rab.)
Beheyt, P., with Dricot & Charles, 714 (Def. Dis.)
Behrer, M. R., (67) (Hel.)
Bejarano, J. F. R., with Blaksley & del Ponte, 262 (Y.F.)
Belios, G. D., 357 (Mal.)
Belisario, J. C., (994) (Der.)
Bell, S. D., Jr., with Otto, Brown & Thetford, 982 (Hel.)
Bellon, J., with Parrot, (909) (Ent.)
Belloni, G. & Muzzolini, M., 163 (Hel.)
Beltrán, E., with Sandoval & Downs, (196) (Ent.)
Benchimol, A. B. & Schlesinger, P., 640 (Def. Dis.)
Benitez Armas, S., (502) (Y.F.)
Benmussa, with Durand & Caruana, 253 (Leish.)
Bennet, J., 434 (Def. Dis.)
Bennett, B. M., with Hansen, 866 (Am.)
Benyesch, M., with Dreyfuss & Mundel, 305 (Haem.)
Béquignon, R. & Vialat, C., 1041 (Rab.)
Berberian, D. A., Dennis, E. W., Korns, R. F. & Angelo, C. A., 867 (Am.)
Berck, B. & Smallman, B. N., 1010 (Ent.)
Berenson, G. S. & Burch, G. E., 549 (Heat Str.)
Bergeret, C., 10 (Mal.)
Bergouniou, J. L., 715 (Def. Dis.)
—— & Trémolières, J., 793, 1068 (Def.Dis.)
Bergstermann, H., Mendheim, H. & Scheid, G., 568 (B.R.)
Berka, W., with Mohr, Knüttgen & Ohr, 159 (Hel.)
de Bernardi, E., 163 (Hel.)
Bernet, A., 593 (Mal.)
Bernet, M., 479 (Mal.)
Bertazzi, C. G., 958 (R.F.)
Bertin, V., 182 (Vms.)
——, with Neghme, 526 (Hel.)
Bertram, D. S., Roberts, E. W. & Edwards, H., 1009 (Ent.)
Bertrand, M., 902 (Ulc.)
Bervoets, W. P., 532 (Def. Dis.)
—— & Damm, A., 948 (Pl.)
Best, P., with le Riche, Riordan, Smit, Ockerse, Kinnear, Walker, du Toit, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Bettinotti, C. M., 127 (Tryp.)
Beye, H. K., 167 (Hel.)
——, with Thooris, 167 (Hel.)
Bhaduri, B. N. & Agarwalla, R., 549 (Oph.)
Bhajekar, M. V., 292 (Hel.)
Bhatia, B. B., with Sharma, 641 (Haem.)
Bhattacharjee, B., 1155 (Ulc.)
Bhattacharya, D. L., with Sen Gupta & Das Gupta, 28 (Leish.)
Bhattacharyya, B., with Sen Gupta, 608 (Leish.)
Bhattacharyya, K., with De, Sengupta & Konar, 757 (Bl.)
Bhoumik, A., 398 (Am.)
Biaggi, N., 1057 (Hel.)
Bianco, I., with Silvestroni, 794 (Haem.)
Bieling, 263 (Rab.)
Biérent, P., 546 (Oph.)
Bietti, G., (447) (Oph.)
Bietti, G. B. & Pasca, G., 312 (Oph.)
Biguet, J., with Coutelen, Gervois, Cochet & Mullet, 970 (Hel.)
Biheu, O., with Schneider & Montézin, 666 (Mal.)
Bijlmer, J., 959 (R.F.)
Binde, H., Kramer, S., Preuss, G. & Weyer, F., 497 (Typh.)
Bingel, K. F., Laier, R. & Mannhardt, S., 1109 (Typh.)
Biocca, E. & di Bona, M., 172 (Hel.)
Birks, P. H., 768 (Den.)
Birt, L. R. B., 752 (Mal.)
Birtwell, S., (751) (Mal.)
Bishop, A., 355 (Mal.)
—— & McConnachie, E. W., 673 *bis* (Mal.)
Bismanis, J., with Darzins, 856 (Rab.)
Björkenheim, G., 178, 537 (Haem.)
Blaas, K. H. & Pfeuffer, F., 423 (Hel.)
Blache, R., with Montestruc, 518, 1131 (Lep.)
Black, J., with Korprowski & van der Scheer, 507 (Rab.)
Black, R. H., 238, 932 (Mal.)
Blaksley, J. C., del Ponte, E. & Bejarano, J. F. R., 262 (Y.F.)
Blanc, F. & Cros, R., (750) (Mal.)
—— & Martin, M., (509) (Pl.), 863 (Am.)
——, Touzin, R. & Villa, T., 1118 (Am.)
Blanc, G. & Bruneau, J., 651 (Prot.)
——, —— & Chabaud, A., 650 (Prot.)
——, Chabaud, A. G. & Bruneau, J., 52 (R.F.)
——, Joyeux, C. & Bruneau, J., 259 (Typh.)
Blanco Rabassa, E., with Basnuevo & Cowley Chávez, (293) (Hel.)
——, with ——, Cowley, Achkar & Maduro, 638 (Hel.)
——, with ——, Cowley Chávez, Sotolongo & Achkar, (293), 429 (Hel.)
Blankhart, D. M., 535 (Def. Dis.)
Blanton, F. S. & Tani, T. G., 255 (Typh.)
Blass, J., Lecomte, O. & Macheboeuf, M. (618) (Chl.)
Blewitt, B., (257) (Typh.)
Blickenstaff, R. T., with Hass & Neher, (454) (Ent.)
Bliss, T. L., with Schnitker & Mattman, 173 (Def. Dis.)
Blitstein, I., 299 (Haem.)
Bloch, F., with Baylon, Giroud & Coumel, 613 (Typh.)
Blomenfeld, E., with Roche, Convit & Medina, 58 (Lep.)

Blumberg, B., McGiff, J. & Guicherit, I., 838 (Mal.), 979 (Hel.)
Blumberg, N., with Sigel, Weiss & Doane, 762 (Typh.)
Blynn, E., with Scott, (498) (Typh.)
Boase, A. J., with Duke-Elder & Ainslie, 900 (Oph.)
Bock, M., with Schubothe & Wiesmann, 36 (Typh.)
Bocobo, D. L., with Salcedo, Regala, Pascual, Santiago, Intengan, Bautista & Concepcion, (75) (Def. Dis.)
Boenjamin, R., 57, 404, (872) (Lep.)
Boettiger, E. G. & Furshpan, E., (1158) (Ent.)
Bogucki, A. S., with Clark, Lennette, Dean & Walker, 38 (Typh.)
Boiron, H., 616 (Pl.)
Bolgert, M., Montel, L. R. & Mollinedo, R., 279 (Lep.)
Bolivia: Min. de Higiene y Salubridad, (100) (Reports, etc.)
di Bona, M., with Biocca, 172 (Hel.)
Bonatti, A. A., with Olmos Castro, 408 (Lep.)
Bonilla-Naar, A., 567 (Reports, etc.)
Bonnet, D. D., (555) (Ent.)
——, with Gross & Baker, 509 (Pl.)
——, Mau, E. S. C. & Gross, B., 510 (Pl.)
Bonne-Wepster, J., 110 (Mal.)
Bonnin, H., (10) (Mal.)
von Bonsdorff, B., 418 (Hel.)
—— & Gordin, R., 418 (Hel.)
de Bont, A. F. & de Bont Hers, M. J., 1135 (Hel.)
de Bont Hers, M. J. with de Bont, 1135 (Hel.)
Borasi, M., with Redaelli, Cavallero, Sala & Amira, 444 (Der.)
Borbolla, L., with Basnuevo, Lavín, Rodríguez Salinas, Costales & Cepero, 639 (Hel.)
Bordas, E., with Downs, 601 (Mal.)
——, with —— & Correa Colorado, 16 (Mal.)
——, with —— & Enríquez Chávez, 121 (Mal.)
——, with —— & Navarro, 204 (Ent.)
Borgers, G., (724) (Misc. Dis.)
Borges, F. J., with Workman, Hightower, Furman & Parker, 1037 (Typh.)
Born, W. C., 927 (Mal.)
Borrotchin, M., with Pellegrino, Leite & Brener, 678 (Tryp.)
Boscardi, F. & Coltorti, M., 285 (Hel.)
Bose, P. N., with Seal & Ghosal, (46) (Pl.)
Boturão, E., 642 *bis* (Haem.)
Bouillon, A., (1052) (Hel.)
Boulard, C., with Portier & Massonnat, (609) (Leish.)
Bourdin, J. L., 231 (Mal.)
Boush, G. M., with DeLong & Lea, 1003 (Ent.)
Boutet, R., with Galliard, 1034 (Tryp.)
Bow, M. R. & Brown, J. H., 766 (Typh.)
Bowen, R., 84 (Ent.)
Boyd, H. M., 32 (Typh.)
Boyd, J. S. K., 774 (Lep.)
Bozeman, F. M., with Wisseman, Hahn, Jackson & Smadel, 681 (Typh.)
Bozicevich, J., with Tobie, Reardon, Shih, Mantel & Thomas, 267 (Am.)
——, Tobie, J. E., Thomas, E. H., Hoyem, H. M. & Ward, S. B., 431 (Hel.)
Bradbury, F. R., with Armstrong & Standen, 93 (Ent.)
Brage, D., 156 (Lep.)
Brand, P. W., (969) (Lep.)
von Brand, T., 379 (Tryp.), 460 (B.R.)
——, with Mehlman, (876) (Hel.)
——, Weinstein, P. P., Mehlman, B. & Weinbach, E. C., 1067 (Hel.)
Brandão, C. H., with Piza, de Macedo, Monteiro & Neto, (257) (Typh.)
Branson, H. & Banks, L. O., (538) (Haem.)
Bras, G. & Lie Kian Joe, (427) (Hel.)
Brasch, A., with Traub, Friedemann, Huber & Kaplan, 507 (Rab.)
Brasil, A., 251 (Tryp.)
Brat, L., 999 (Prot.)
Brazil, 462 (B.R.)
Breazeale, E. L., with Greene, 1067 (Hel.)
Breeland, S. G., (9) (Mal.)
Brener, Z., with Pellegrino, 1034 (Tryp.)
——, with ——, Borrotchin & Leite, 678 (Tryp.)
Brennan, J. M., (809) (Ent.)
——, with Wharton, Jenkins, Fuller, Kohls & Philip, 93 (Ent.)
Breuil, M., 956 (Am.)
Briones, S., 381 (Tryp.)
Brit. Med. Bull., 353 (Mal.)
Britto, R. S. & Cotrim, J., 592 (Mal.)
Brizard, H., with Giroud, Le Gac & Laurent, 1106 (Typh.)
Brock, J. F. & Autret, M., 988 (Def. Dis.)
Brock, N., Erhardt, A. & Wilmanns, H., 712 (Hel.)
Brooks, A. G., with Ahuja, d'Silva & Thomas, 1040 (Rab.)
——, with d'Silva, Thomas & Ahuja, 1040 (Rab.)
Brown, A. W. A., 323 (Ent.), 1092 (B.R.)
——, with Peterson, 322 (Ent.)
——, with Sarkaria, 196 (Ent.)
——, Sarkaria, D. S. & Thompson, R. P., 196 (Ent.)
——, Thompson, R. P., Twinn, C. R. & Cutkomp, L. K., 451 (Ent.)
Brown, C. P., 1047 (Lep.)
Brown, H. W., with Otto, Bell & Thetford, 982 (Hel.)
Brown, J. H., with Bow, 766 (Typh.)
Brown, R., 962 (Lep.)
Broz, V., with Murray, Pšorn, Djaković, Sielski, Ljupša, Gaon, Pavlević & Snyder, 383 (Typh.)
Bruce, W. N., (93), 559 (Ent.)
——, with Decker, 1159 (Ent.)
Bruce-Chwatt, L. J., 221, 222 (Mal.)
—— & Elliott, R., 909 (Ent.)
Brueckner, A. L., with Haedicke, Reagan & Schenck, 966 (Lep.)
——, with Reagan, 614 (Rab.)
——, with ——, Lineweaver & Schenck, 137 (Rab.)
Brummer, P., 527 (Hel.)
Brumpt, L. C., (78) (Haem.)
Bruneau, J., with Blanc, 651 (Prot.)
——, with —— & Chabaud, 52 (R.F.), 650 (Prot.)
——, with —— & Joyeux, 259 (Typh.)
Brunetti, O., with Lennette, Clark, Abinanti & Covert, 766 (Typh.)
Bruno-Smiraglia, C., with Oddo, 845 (Mal.)
Bruyning, C. F. A., 1022 (Mal.)
Brygoo, E. & de Jaureguiberry, P., 724 (Misc. Dis.)
Brygoo, E. R., with de Lajudie & Porte, 724 (Misc. Dis.)
Brygoo, E. R. R., 166 (Hel.)

Bucco, G., 272 (Am.)
Buck, J. B. & Keister, M. L., 1162 (Ent.)
Buck, J. S., with Surrey & Suter, (1133) (Hel.)
Buckley, J. J. C., 709, 1061 (Hel.)
Budden, F. H., 896 (Oph.)
Budtz-Olsen, O. E. & Woolf, C. R., 1150 (Haem.)
Bueding, E. & Yale, H. W., (285) (Hel.)
Bueno Garcia, A., 481 (Mal.)
Bulger, J. J. & Northrop, A. K., Jr., 443 (Vms.)
Bull. World Health Organization, 654 (Reports, etc.)
Burch, G. E., with Berenson, 549 (Heat Str.)
Burch, H. B., Salcedo, J., Jr., Carrasco, E. O. & Intengan, C. L., 791 (Def. Dis.)
Burch, T. A., 170 (Hel.)
—— & Ashburn, L. L., 74 (Hel.)
Burckhalter, J. H. & Edgerton, W. H., (49) (Am.)
Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase 240, 242 (Tryp.)
Burgdorfer, W., 512 (R.F.)
Burgess, P., 463 (B.R.)
Burgess, R. W., with Ramakrishnan, Young, Jeffery & McLendon, 924, (Mal.)
Burke-Gaffney, H. J. O'D., 1086 (Reports, etc.)
Burns, K. F., 80 (Vms.)
——, with Steer & Olin, 44 (Rab.)
Burrows, R. B. & Jahnes, W. G., Jr., 1123 (Am.)
Busch, E. & Cooper, M., 703 (Hel.)
de Bustamante, F. M., Pinto, O. da S., Guedes, A. S., Xavier, S. H. & Freitas, J. R., 17 (Mal.)
Bustamante, M. E., Varela, G. & Roch, E., 135 (Typh.)
Busvine, J. R., 89, 1006 (Ent.)
Butler, G. C., with Hurst, 306 (Vms.)
Butts, J. S., with Hoffman & Lindquist. 88 (Ent.)
——, with ——, Roth & Lindquist, (808) (Ent.)
——, with Lindquist, Roth & Hoffman, 561 (Ent.)
——, with Yates & Lindquist, (1083) (Ent.)
Buxton, A. P., 1110 (Y.F.)
Buxton, P. A., 1006 (Ent.)
Byron, F. E., with Field & Green, 911 (Reports, etc.)

C

Cabassu, H., with Ranque & Depieds, 130 (Leish.)
Cabezas, J., with Droguett del Fierro, Raffo & Moreno, 78 (Vms.)
de Caires, P. F., 386 (Y.F.)
Calero M., C., 49 (Am.)
——, Núñez, J. M. & Silva Goytía, R., 1108 (Typh.)
Calero Elorduy, C., 755 (Mal.)
Cali', G., with Ruggieri, 273 (Am.)
Callot, J. & Puech, J., 999 (Prot.)
Calvó Fonseca, R., (976) (Hel.)
Camain, R., with Dejou, 171 (Hel.)
——, Navarranne, P. & Ayite, E., 61 (Hel.)
——, Vernier, J., Navarranne, P. & Ayite, E., (1133) (Hel.)
Cameron, I. G., 1011 (Reports, etc.)
Caminopetros, J., 893 (Haem.)
Campbell, R. W. H., 226 (Mal.)
Campillo Sáinz, C., Roch Ubiría, E. & Pizarro Suárez, E., 137 (Rab.)
Campos, R., with Coutinho & Amato Neto, 977 (Hel.)
Candau, M. G., with Deane, 728 (Ent.)
Canet, J., 232 (Mal.), 1063 (Hel.)
——, with Schneider & Dupoux, 664 (Mal.)
Cannata, C., with Arcuri 627 (Lep.)
Cantrell, W. F. & McGeachin, R. L., 492 (Tryp.)
Carayon, A., with Déjou, (1047) (Am.)
—— & Dieng. J., 997 (Misc. Dis.)
Cardama, J. E., with Basombrío, Gatti, Colombo & Wilkinson, 57 (Lep.)
——, with Negroni, Gatti & Baliña, 646 (Der.)
Carlile, J. P., Duff, W. R. & MacGregor, R. G. S., 1068 (Def. Dis.)
Carmichael, J., 1086 (Reports, etc.)
Carminati, G. M., with Ercoli, Gosford, Kley & Schwartz, 249 (Tryp.)
Carney, B. H., with Meleney, Moore & Most, 880 (Hel.)
Carpenter, S. J., (555) (Ent.)
—— & Keenan, C. M., (910) (Ent.)
Carrasco, E. O., with Burch, Salcedo & Intengan, 791 (Def. Dis.)
Carri, E. L. & Cellerino, N. A., 59 (Hel.)
Carrington, H. C., Crowther, A. F., Davey, D. G., Levi, A. A. & Rose, F. L., 362 (Mal.)
Carroll, D. S., with McVay, 799 (Der.)
Caruana, with Durand & Benmussa, 253 (Leish.)
Carvalho, C. M., with Mauri & Hadler, 412 (Lep.)
de Carvalho, F. F. & Rachou, R. G., 1021 (Mal.)
Casala, A. M., 1118 (Am.)
Casile, M., 1143 (Hel.)
—— & Saccharin, H., (638) (Hel.)
Casillas, J., with Ruiz Sanchez, Paredes & Riebeling, (233) (Mal.)
——, with ——, ——, Velazquez & Riebeling, 597 (Mal.)
Cassel, J., with Kark, 914 (Reports, etc.)
Castellani, A., (902) (Ulc.)
Castorina, S., 31 (Typh.)
Castresana Garćia, M., 326 (Ent.)
Castro, A. & Trejos, A., 306 (Der.)
de Castro, J., (532) (Def. Dis)
Castro, M., with Romeo Viamonte, 908 (Ent.)
Causey, O. R. & Dos Santos, G. V., 504 (Y.F.)
Cavaceppi, L., 486 (Mal.)
Cavallero, C., with Redaelli, Borasi, Sala & Amira, 444 (Der.)
Cavett, J. W., with Kerr, 886 (Hel.)
Cavier, R., (530) (Hel.)
Cebe, J., (250) (Tryp.)
Cellerino, N. A., with Carri, 59 (Hel.)
Cepero, R., with Basnuevo, Lavín, Borbolla, Rodríguez Salinas & Costales, 639 (Hel.)
Cerqueira, N. L., with Kumm, 42, 43 (Y.F.)
Chabaud, A., with Blanc & Bruneau, 650 (Prot.)
Chabaud, A. G., 983 (Hel.)
——, with Blanc & Bruneau, 52 (R.F.)
Chadwick, L. E., 1159 (Ent.)
Chakravarti, A., 955 (Am.)
Chakravarti, H., 155 (Lep.)
——, with Chaudhuri & Dutta, 301 (Haem.), (951) *bis*, 951 (Chl.)
Chakravarti, H. S., 987 (Def. Dis.)
Chakravarty, N. K. & Chaudhuri, R. N., 539 (Ep. Dropsy)
——, with ——, 718 (Ep. Dropsy)
——, with ——, Rai Chaudhuri & Poti, 595 (Mal.)
Chamard, R., with Le Gac, Giroud & Reizes, 36 (Typh.)
Chan, K., 1066, 1067 (Hel.)

Chanarin, I., 439 (Haem.)
Chand, D., (977) (Hel.)
Chanda, N. N., with De & Sengupta, 1116 (Chl.)
Chandler, A. C., with Dias, 494 (Tryp.)
Chandrashekhar, C., with Das Gupta, 1149 (Haem.)
Chang, A., with Chung, Chow & Ts'Ao, 29 (Leish.)
Chang, C. E. & Chang, H. L., 546 (Oph.)
Chang, H., 801 (Oph.)
Chang, H. F., 883 (Hel.)
Chang, H. L., with Chang, 546 (Oph.)
Chang, I. C., with Hunter, Ritchie *et al.*, 1050 (Hel.)
Chang, S. L., with Fair & Richart, 480 (Mal.)
—— & Richart, F. E., Jr., 479 (Mal.)
Chang, S. T., with Koenigstein, 409 (Lep.)
Chang, T. L., with Chow & Watson, 111 (Mal.)
——, Watson, R. B. & Chow, C. Y., 110 (Mal.)
Chapman, J. S., with Lindsay & Gossard, 620 (Am.)
Chardome, M. & Janssen, P. J., 1095 (Mal.)
—— & Peel, E., 982 (Hel.)
——, with van den Berghe, 788 (Hel.)
Charles, P., with Dricot & Beheyt, 714 (Def. Dis.)
——, with van Oye, 229 (Mal.), 552 *bis* (Misc. Dis.), 732 (Reports, etc.), 992 (Haem.)
Chatterjee, P. K. & Roy, B. B., (164) (Hel.), 621 (Am.)
Chatterjee, S. N., with Dharmendra & Mukerjee, 520 (Lep.)
Chaudhuri, R. N., 1155 (Ulc.)
——, Chakravarti, H. & Dutta, B. N., 301 (Haem.), (951) *bis*, 951 (Chl.)
——, with Chakravarty, 539 (Ep. Dropsy)
—— & Chakravarty, N. K., 718 (Ep. Dropsy)
——, —— & Rai Chaudhuri, M. N., with Poti, S. J., 595 (Mal.)
——, with Das, Ghosa i& Gupta, 691 (Chl.)
—— & Dutta, B. N. ,253 (Leish.)
——, Rai Chaudhuri, M. N. & Dutta, B. N., 1098 (Mal.)
——, with Sodeman & Banerjee, 1046 (Am.)
Chaudhuri, S., 77 (Haem.)
Chaussinand, R., 520 (Lep.)
Chellappah, S. F. & Jacocks, W. P., 340 (B. R.)
Chelly, M., with Corcos, Delastre & Abitbol, 164 (Hel.)
Chen, T. & Sumerford, W. T., (95) (Ent.)
Chen, T. H., Quan, S. F. & Meyer, K. F., 617 (Pl.)
Chen, T. N., with Chow & Yue, 810 (Ent.)
Chernoff, A. I. & Josephson, A. M., 77 (Haem.)
——, with Singer, 538 (Haem.)
Chesterman, C. C., 565 (Reports, etc.)
Chida, F., with Sato, 1050 (Lep.)
Chieffi, G., 325 (Ent.)
—— & Basso, M., 1117 (Am.)
Ch'in, K. Y., Liu, W. & Liu, Y., 853 (Typh.)
Ch'in, Y. T., 172 (Hel.)
Choquette, L. P. E., with Gayot & Poul, 506 (Rab.)
Choremis, C., Zervos, N., Constantinides, V. & Zannos, L., 175 (Haem.)
Chow, C. C., with Tang, Wang, Sieh & Chow, 702 (Hel.)
Chow, C. Y., with Chang & Watson, 110 (Mal.)
——, Watson, R. B. & Chang, T. L., 111 (Mal.)
——, Yue, T. F. & Chen, T. N., 810 (Ent.)
Chow, H., with Chung, Chang & Ts'Ao, 29 (Leish)
Chow, L. P., with Watson, Paul & P'Eng, 12 (Mal.)
Chow, S. L., with Tang, Chow, Wang & Sieh, 702 (Hel.)
Chow, Y., with Fu, Wu & Wu, 161 (Hel.)
Chow, Y. L., with Kao, 171 (Hel.)
Chowdhury, L. M., with Rudra & Sinha, 904 (Misc. Dis.)
Christen, R., Agosin, M., Jarpa, A. & Atias, A. V., 128 (Tryp.)
——, with ——, ——, —— & Neghme, 849 (Tryp.)
——, ——, Pino, F., Jarpa, A., Thiermann, E. & Neghme, A., (650) (Prot.)
——, with Jarpa, Agosin & Atias, 128 (Tryp.)
——, with Neghme, Agosin & Rubio, 868 (Am.)
——, with Neghme, Badínez, Jarpa, Thiermann & Agosin, 1104 (Tryp.)
——, with ——, Thiermann, Pino & Agosin, 1157 (Prot.)
Christophers, S. R., 1003 (Ent.)
——, with Mattingly, Rozeboom, Knight, Laven, Drummond & Shute, 651 (Ent.)
Chu, G. W. T. C., 1058 (Hel.)
Chun, D., (951) (Chl.)
Chung, H., Chow, H., Chang, A. & Ts'Ao, Y., 29 (Leish.)
—— & Feng, L., with Feng, S., 849 (Leish.)
——, Hou, T., Huang, T. & Weng, H., 66 (Hel.)
Ciaccio, G., with Giroud, 32 (Typh.)
Ciauri, G., (1060) (Hel.)
Ciferri, R., 444 (Der.)
Cilli, V., 506 (Rab.), 540 (Vms.)
Cissoko, M., with Mornet & Lalanne, (492), (607), (Tryp.)
Cittanova, A., with Corcos, 594 (Mal.)
Claessens, H., 935 (Tryp.)
Clark, H. C., 684 (Y.F.)
Clark, W. H., Bogucki, A. S., Lennette, E. H., Dean, B. H. & Walker, J. R., 38 (Typh.)
——, with Lennette, Abinanti, Brunetti & Covert, 766 (Typh.)
——, with ——, Dean, Abinanti, Winn & Holmes, 39 (Typh.)
——, with ——, & Jensen, 500 (Typh.)
——, with ——, —— & Toomb, 1039 (Typh.)
——, Lennette, E. H., Railsback, O. C. & Romer, M. S., 136 (Typh.)
——, —— & Romer, M. S., 38, 258 (Typh.)
——, Romer, M. S., Holmes, M. A., Welsh, H. H., Lennette, E. H. & Abinanti, F. R., 38 (Typh.)
Clarke, G. H. V., 183 (Der.)
Clastrier, J., with Parrot, (1083) (Ent.)
Clausse, J., with Fabiani, Vargues & Grellet, 484 (Mal.)
Clavero, G., 116 (Mal.)
——, with Pérez Gallardo & Hernández, 938 (Typh.)
Clavié, L. C., 903 (Ulc.)
Clay, T., with Hopkins, (1162) (Ent.)
Cluzel, P., with Germain, 401 (Am.)
Čmelik, S., (976) *bis* (Hel.)
Coatney, G. R., with Greenberg & Trembley, 122 (Mal.)
——, with Mercado, 670, 844 (Mal.)
——, with Taylor, Josephson & Greenberg, 674 (Mal.)
——, with Trembley & Greenberg, 122 *bis* (Mal.)
Cochet, G., with Coutelen, Gervois, Biguet & Mullet, 970 (Hel.)

Cochrane, R. G., 409, 774, 1124, 1129 (Lep.)
Coffey, J. H., with Schoof & Siverly, 324 (Ent.)
Coffin, G. S., 238, 239 (Mal.)
Coggeshall, L. T. (666) (Mal.)
Cohen, A. B., 19 (Tryp.)
Cohen, B. S., Meyer, L. M. & Fadem, R., 992 (Sp.)
Cohen, S., with Murray, Jampol, Ofstrock & Snyder, 681 (Typh.)
Colas-Belcour, J., Néel, R. & Vervent, G., 698 (R.F.)
—— & Rageau, J., 556 (Ent.)
Cole, M. M., with Smith, 13 (Mal.)
Coleman, N., with Luttermoser, Haskins & Jumper, 697 (Am.)
Colless, D. H., 110 (Mal.), (729) (Ent.)
Collignon, E., 1001 (Ent.)
—— & Juillan, M., 476 (Mal.)
——, with Sergent, 220 (Mal.)
Colombo, C. V., with Basombrío, Gatti, Cardama & Wilkinson, 57 (Lep.)
Colonial Office, 19 (Tryp.), 201 (Ent.), 205 (Reports, etc.)
Coltori, M., with Boscardi, 285 (Hel.)
Commonwealth Agricultural Bureaux, 812 (B.R.)
Conant, N. F., with Vogel, 798 (Der.)
Concepcion, I., with Salcedo, Regala, Pascual, Santiago, Intengan, Bautista & Bocobo, (75) (Def. Dis.)
Concha, E., 534 (Def. Dis.)
Congo Belge, 328, 913 (Reports, etc.)
Conley, C. L., with Green, 177 (Haem.)
Conn, H. C. & Greenslit, F. S., 980 (Hel.)
Connola, D. P., with Granett & Lembach, 94 (Ent.)
Constantinides, V., with Choremis, Zervos & Zannos, 175 (Haem.)
Contardo, R., 311 (Oph.)
Contopoulos, A. N., with Anderson & Anderson, 952 (Am.)
——, with ——, Hrenoff, Anderson & Nakamura, 1121 (Am.)
Convit, J., with Roche, Medina & Blomenfeld, 58 (Lep.)
Cooke, W. E., 774 (Lep.)
Coonoor, 655 (Reports, etc.)
Cooper, M., with Busch, 703 (Hel.)
Cooray, G. H., 164 (Hel.)
Copland, W. A., 644 (Der.)
Corcos, A. & Cittanova, A., 594 (Mal.)
——, Delastre, R., Chelly, M. & Abitbol, S., 164 (Hel.)
——, Dupoux, R. & Abitbol, S., 284 (Hel.)
Cornbleet, T., 716 (Haem.)
Cornejo, A., 31 (Leish.)
Cornet, A., with Justin-Besançon & Giroud, 384 (Typh.)
Corradetti, A. & Verolini, F., 371 (Mal.)
Corrêa, M. O. A., 528 (Hel.)
——, with Meira, 401 (Am.)
Corrêa, R. R. & Lima, F. de O., (9) (Mal.)
—— & Schiavi, A., 494 (Tryp.)
Correa Colorado, M., with Downs & Bordas, 16 (Mal.)
Correa T., E., with Schenone, Pizzi, Badínez & Vázquez, (1103) (Tryp.)
Cortés Ochoa, R., with Mendiola, 183 (Der.)
Cosgrove, K. W., 546 (Oph.)
Costa, J. A., 724 (Misc. Dis.)
Costa, J. L., with de Lucena, 7 (Mal.)
da Costa, O. R., Manceau, J. N., Maroja, R. & de Andrade, G. C., 706 (Hel.)
Costa, R. S., 148, 150 (Am.)
Costales, F., with Basnuevo, Lavín, Borbolla, Rodríguez Salinas & Cepero, 639 (Hel.)
Costerousse, L., with Crosnier, Darbon & Ducournau, 863 (Am.)
Cotrim, J., with Britto, 592 (Mal.)
Coumel, H., with Baylon, Bloch & Giroud, 613 (Typh.)
Coutelen, F., Gervois, M., Cochet, G., Biguet, J. & Mullet, S., 970 (Hel.)
Coutinho, J. O., 634 (Hel.)
——, Campos, R. & Amato Neto, V., 977 (Hel.)
——, with Pessôa, 876 (Hel.)
Covell, G., 103 (Mal.)
—— & Nicol, W. D., 355 (Mal.)
Covert, J. M., with Lennette, Clark, Abinanti & Brunetti, 766 (Typh.)
Cowley, O., with Basnuevo, Blanco Rabassa, Achkar & Maduro, 638 (Hel.)
Cowley Chávez, O., with Basnuevo, (294) (Hel.)
——, with —— & Blanco Rabassa, (293) (Hel.)
——, with ——, Sotolongo, Blanco Rabassa & Achkar, (293) 429 (Hel.)
Cox, H. R., (255) (Typh.)
——, with Koprowski, 615 (Rab.)
Cresté, M., with Merland, 363 (Mal.)
Crisley, F. D., with Wertman & Sarandria, 1107 (Typh.)
Cros, R., with Blanc, (750) (Mal.)
Crosnier, R., Darbon, A., Ducournau, P. & Costerousse, L., 863 (Am.)
Cross, J. B., 1158 (Prot.)
Crowell, R. L., with Resnick, 199 (Ent.)
Crowther, A. F., with Carrington, Davey, Levi & Rose, 362 (Mal.)
Crozes, M., 59 (Hel.)
Crozes & Guth, 904 (Ulc.)
Cseh Firtos, S., 927 (Mal.)
Cullen, J., with Dolkart & Halpern, 270 (Am.)
Cullumbine, H., 222 (Mal.), 433 (Def. Dis.)
——, Basnayake, V. & Kottegoda, S. R., 723 (Heat Str.)
——, with Jayasekera & de Mel, 436 (Def. Dis.)
Culwick, A. T., Fairbairn, H. & Culwick, R. E., 23 (Tryp.)
Culwick, G. M., 465 (B.R.)
Culwick, R. E., with Culwick & Fairbairn, 23 (Tryp.)
Curban, G. V., (517) (Lep.)
Curbelo, A., Márquez, V. & Veciana, J. A., 33 (Typh.)
Curcio, R. & Polosa, P., 229 (Mal.)
Cutbush, M., with Lehmann, 1152 (Haem.)
Cutkomp, L. K., with Brown, Thompson & Twinn, 451 (Ent.)
Cutler, J. C., with Kvittingen, Guevara, McCullough, Rose, Ford, Tampi, Sen, Lakshwir, Khan & Dass, 967 (Lep.)

D

Dakshinamurty, S. & Sharma, M. I. D., 1001 *bis* (Ent.)
Dalmat, H. T., 291 (Hel.), (909) (Ent.)
Daly, P. F., with Hughes, 168 (Hel.)
Damluji, S., with Watson & Fawzi, 1133 (Hel.)

Damm, A., with Bervoets, 948 (Pl.)
Danaraj, T. J., 316 (Misc. Dis.)
d'Antoni, J. S., 692 (Am.)
——, with Sodeman & Doerner, 695 (Am.)
Darbon, A., with Crosnier, Ducournau & Costerousse, 863 (Am.)
Darling, R. C., with Tosteson & Shea, (893) (Haem.)
Darzins, E. & Bismanis, J., 856 (Rab.)
Das, A., Ghosal, S., Gupta, S. K. & Chaudhuri, R. N., 691 (Chl.)
—— & Roy, S. K., 856 (Rab.)
——, with Saha, 46, 1115 (Chl.)
Das, K. N., (1156) (Ulc.)
Das Gupta, C. R., 1155 (Ulc.)
——, with Chandrashekhar, C., 1149 (Haem.)
——, with Sen Gupta, 130 (Leish.)
Das Gupta, N. N., with Sen Gupta & Bhattacharya, 28 (Leish.)
Dass, P., with Kvittingen, Cutler, Guevara, McCullough, Rose, Ford, Tampi, Sen, Lakshwir & Khan, 967 (Lep.)
Dassanayake, W. L. P., with Schmid, 71 (Hel.)
Dauis-Lawas, D., with Stransky & Lawas, 75 (Def. Dis.)
——, with —— & Vicente, 76 (Def. Dis.)
Dauis-Lawas, D. F., with Stransky, 179 (Haem.)
——, with Tupas, 49 (Am.)
Daum, K., with Bean & Franklin, 298 (Def. Dis.)
Davey, D. G., 355 (Mal.)
——, with Carrington, Crowther, Levi & Rose, 362 (Mal.)
Davey, J. T. & O'Rourke, F. J., 289 (Hel.)
Davey, T. H., with Muirhead-Thomson & Gordon, 1006 (Ent.)
David, A., with Jaswant Singh & Nair, 674 (Mal.)
Davidovitch, S., with Olejnik, 143 (Chl.)
Davidson, G., 117 (Mal.)
Davies, D. M., with Fallis & Vickers, 488 (Mal.)
Davies, R. G., 1028 (Tryp.)
Davis, A. N., with Keller & Mooney, 235 (Mal.)
Davis, B. C., with Hill, 1153 (Haem.)
Davis, C. L., with Lapi & Anderson, 945 (Rab.)
Davis, D. E., 497 (Typh.)
Davis, W. M. & Most, H., 986 (Hel.)
Dawood, M., with Nor El Din, 63 (Hel.)
Dawood, M. M., 970 (Hel.)
De, N. N., with Rao & Ramaswamy, 123 (Mal.)
De, S. N., Sarkar, J. K. & Tribedi, B. P., 618 (Chl.)
—— & Sengupta, K. P., (695) (Am.)
——, ——, Bhattacharyya, K. & Konar, N. R., 757 (Bl.)
——, —— & Chanda, N. N., 1116 (Chl.)
Dean, B. H., with Clark, Bogucki, Lennette & Walker, 38 (Typh.)
——, with Lennette, Abinanti, Clark, Winn & Holmes, 39 (Typh.)
Dean, R. F. A., 731 (Reports, etc.)
Deane, L. M., 887 (Hel.)
—— & Candau, M. G., 728 (Ent.)
Decker, G. C. & Bruce, W. N., 1159 (Ent.)
Déjou, L., 428, (888) (Hel.)
—— & Camain, R., 171 (Hel.)
—— & Carayon, A., (1047) (Am.)
de la Lastra, J. M., (517) (Lep.)
Delastre, R., with Corcos, Chelly & Abitbol, 164 (Hel.)
Della Rocca, L., with Baldi, 602 (Mal.)
Delon, J., 535 (Def. Dis.)
DeLong, D. M., Boush, G. M. & Lea, A. O., 1003 (Ent.)
del Ponte, E., 761 (Leish.)
——, with Blaksley & Bejarano, 262 (Y.F.)
Demuylder, C., with Rodhain, (322) (Prot.)
Dennis, E. W., with Berberian, Korns & Angelo, 867 (Am.)
Depieds, R., with Ranque & Cabassu, 130 (Leish.)
Derias, L., 445 (Oph.)
Dernoncourt, Y., with Pagès & Paqui, 1073 (Oph.)
Derryberry, O. M. & Gartrell, F. E., 930 (Mal.)
DeSa, A. E., 978 (Hel.)
Desai, S. D., with Figueredo, 57, 966 (Lep.)
Desai, V. G., 364 (Mal.)
Deschiens, R., 281, 776, 777 (Hel.), 396 (Am.)
—— & Lamy, L., 237 (Mal.)
——, with Poirier, 530 (Hel.)
Deslandes, N., 701 (Hel.)
——, with Penido & Pinto, 701 *bis* (Hel.)
Desmonts, G., with Lelong, 905 (Prot.)
Desowitz, R. S. & Watson, H. J. C., 936, (936) (Tryp.)
Destombes, P., with Floch, 154, 519, 872 (Lep.)
——, with —— & Lecuiller, 277, 278 *bis*, 279 (Lep.)
Desvignes, P. & Morault, 312 (Oph.)
Devadas, R. P. & Sutton, T. S., 76 *bis* (Def. Dis.)
Devignat, R., 45 (Pl.)
Dewey, J. E., with Pimentel & Schwardt, 90 (Ent.)
Dewey, V. C., with Kidder, 461 (B.R.)
DeWitt, W. B., 1135 (Hel.)
Dey, N. C., with Ghosh & Dharmendra, 520 (Lep.)
Dharmendra, (774) (Lep.)
——, with Ghosh & Dey, 520 (Lep.)
——, Mukerjee, N. & Chatterjee, S. N., 520 (Lep.)
Dias, E. & Chandler, A. C., 494 (Tryp.)
Dias, J. A. T. S., (935) (Tryp.)
Dick, G. W. A., 503, 685 (Y.F.)
——, with Haddow, Lumsden & Smithburn, 260 (Y.F.)
Dicke, R. J. & Morgan, B. B., 556 (Ent.)
—— & Paul, J. J., 560 (Ent.)
Dickman, S. R. & Moncrief, I. H., 77 (Haem.)
Dieng, C., with Le Gac & Rouby, (1110) (Y.F.)
Dieng, J., with Carayon, 997 (Misc. Dis.)
Diercks, F. H., with Bailey, Ley, Lewthwaite & Smadel, 34 (Typh.)
——, with Smadel, Ley, Paterson, Wisseman & Traub, 682 (Typh.)
Dierckx, F., 992 (Haem.)
—— & Helmons, J., 438 (Haem.)
Diethelm, L., Heuck, F. & Kloos, K., 978 (Hel.)
Diéz Rivas, F., Hernández Morales, F. & Meyer, L. M., 793 (Sp.)
——, Suárez, R. M., Hernández Morales, F. & Pérez Santiago, E., 991 (Sp.)
Diggs, L. W., with Patterson & Wilson, 538 (Haem.)
Divo, A., Goldman, C. & Lugo, A., 508 (Rab.)
Dixon, J. L., with Stubbs, 798 (Der.)
Djaenoedin, R., with Kraneveld, (429) (Tryp.)
Djaković, P., with Murray, Ljupša & Snyder, 37 (Typh.)
——, with ——, Pšorn, Sielski, Broz, Ljupša, Gaon, Pavlević & Snyder, 383 (Typh.)
Doane, J. C., with Sigel, Weiss & Blumberg, 762 (Typh.)
Dobell, C., 859 (Am.)
Dockeray, G. C., 114 (Mal.)

Dodds, G. E., 646 (Oph.)
Doerner, A. A., with Sodeman & d'Antoni, 695 (Am.)
——, with ——, Gordon & Gillikin, 50 (Am.)
Dole, V. P., Stall, B. G. & Schwartz, I. L., 549 (Heat Str.)
Dolkart, R. E., Halpern, B. & Cullen, J., 270 (Am.)
Dolmatova, A. V., 809 (Ent.)
Domínguez López, F., 277 (Lep.)
Donaldson, R., with King, Bartholomew, Geiser, Ventura, Wootton, Macfarlane & Sisson, 437 (Haem.)
Dörken, H., with Hornbostel, 703 (Hel.)
——, with Prévot & Hornbostel, 636 (Hel.)
Dornoy, J. M., 996 (Misc. Dis.)
Dorset, V. J. & Spriggs, J. B., 1045 (Am.)
Dos Santos, G. V., with Causey, 504 (Y.F.)
Dostrovsky, A., Zuckerman, A. & Sagher, F., 1104 (Leish.)
Doull, J. A., (158) (Lep.)
——, with Guinto, Bancroft & Rodriguez, 54 (Lep.)
Dowling, M. A. C., 234, 367, 1026 *bis* (Mal.)
Downes, J. A., 200 (Ent.)
Downs, W. G., 111 (Mal.)
—— & Bordas, E., 601 (Mal.)
——, —— & Correa Colorado, M., 16 (Mal.)
——, —— & Enríquez Chávez, A., 121 (Mal.)
——, —— & Navarro, L., 204 (Ent.)
——, with Sandoval & Beltrán, (196) (Ent.)
Dreyfuss, F., Mundel, G. & Benyesch, M., 305 (Haem.)
Dricot, C., 632 (Lep.), 913 (Reports, etc.)
——, Beheyt, P. & Charles, P., 714 (Def. Dis.)
Drobeck, H. P., with Manwell, 725 (Prot.)
Droguett del Fierro, A., Raffo, P, Cabezas, J. & Moreno, J., 78 (Vms.)
Drummond, F. H., with Mattingly, Rozeboom, Knight, Laven, Christophers & Shute, 651 (Ent.)
Drysdale, A. D. & Kirk, R., 679 (Typh.)
Drysdale, B., with le Riche, Riordan, Smit, Ockerse, Best, Kinnear, Walker, du Toit, Gerdener, Seward & Steinbach 714 (Def. Dis.)
Du, S., 803 (Misc. Dis.)
Duarte, E., with Torres, Guimarães & Moreira, 720 (Der.)
Dubash, J., with Lenczner, (957), 1045 (Am.)
Dubois, A., 408, 965 (Lep.), 772 (R.F.)
—— & Rademecker, M. A., 408 (Lep.)
Dubois, J., with de Laey, 774 (Lep.)
Ducournau, P., with Crosnier, Darbon & Costerousse, 863 (Am.)
Duff, W. R., with Carlile & MacGregor, 1068 (Def. Dis.)
Duffy, B. J., with Glasgow, 125 (Tryp.)
Duguy, R., 181 (Vms.)
Duke, B. O. L., 1134 (Hel.)
Duke-Elder, S., Ainslie, D. & Boase, A. J., 900 (Oph.)
Duncan, D., 929 (Mal.)
Dunham, W. B., with McDearman, 954 (Am.)
Dupoux, R., with Corcos & Abitbol, 284 (Hel.)
——, with Schneider, 621 (Am.)
——, with —— & Canet, 664 (Mal.)
Durand, P., Bermussa & Caruana, 253 (Leish.)
Durbin, C. G., 19 (Mal.)
Duren, A. N., 364 (Mal.)
Durieux, C., 455 (Reports, etc.)
Dusseau, E. M., with Porter & Laird, 1102 (Mal.)
Dutta, B. B., with Swamy, (1145) (Haem.)
Dutta, B. N., with Chaudhuri, 253 (Leish.)
——, with —— & Chakravarti, 301 (Haem.), (951) *bis*, 951 (Chl.)
——, with —— & Rai Chaudhuri, 1098 (Mal.)
Dutta, N. K. & Narayanan, K. G. A., (992) (Vms.)
Dutta, S. C., 382 (Leish.)

E

Eads, R. B., with Irons, Johnson, Walker & Norris, 499 (Typh.)
East Africa High Commissioner, 95, 913 (Reports, etc.)
Echandi, C. A., with Trejos, 254 (Leish.)
Eddleman, E. E., Jr., Hale, W. H. & Snowden, W. M., 229 (Mal.)
Eden, A., with Hobson & Stephenson, (707) (Hel.)
Edgerton, W. H., with Burckhalter, (49) (Am.)
Edington, G. M., 176 (Haem.)
Edwards, H., with Bertram & Roberts, 1009 (Ent.)
Edwards, J. T., 1086 (Reports, etc.)
Egypt, Gvt. of: 600 (Mal.)
Eichler, W., 225 (Mal.)
Eissa, A. A., with Gohar & Sebai, 878 (Hel.)
Ejercito, A., 601 (Mal.)
Elbel, R. E., (948) (Pl.)
Elberg, S. S., with Rockenmacher & James, 1112 (Pl.)
——, with Silverman, Meyer & Foster, 1043 (Pl.)
El Dine, K. Z., with Halawani & El Fiki, 1038 (Typh.)
El Fiki, A. Y., with Halawani & El Dine, 1038 (Typh.)
Elizondo, A., with Silva-Goytia, 1037 (Typh.)
Elkeles, G., 126 (Tryp.)
El Kholy, M. K., (174) (Def. Dis.)
El Kordy, M. I., with Halawani & Abdallah, 620 (Am.)
Elliott, R., with Bruce-Chwatt, 909 (Ent.)
Ellis, J. P., with Micks, 451, 807 (Ent.)
Elsdon-Dew, R., Armstrong, T. G. & Wilmot, A. J., 1120 (Am.)
——, with Wilmot & Armstrong, 48, 956 (Am.)
Elton, N. W., 684, 856, 943 (Y.F.)
Elvehjem, C. A., with Taborda, Taborda & Williams, 643, 796 (Vms.)
Emmett, J., 719 (Der.)
Endo-Itabashi, T., with McMullen & Komiyama, 784 (Hel.)
——, with ——, ——, Ishii & Mitoma, 415 (Hel.)
——, with ——, ——, ——, Ozawa, Asakawa & Mitoma, 416 (Hel.)
——, with ——, Seto, Komiyama & Stone, 785 (Hel.)
England, B., with Meiklejohn & Lennette, 688 *bis* (Den.)
Englesberg, E., 947 (Pl.)
Enigk, K., 707 (Hel.)
Enríquez Chávez, A., with Downs & Bordas, 121 (Mal.)
Ercoli, N., Gosford, B., Carminati, G. M., Kley, D. & Schwartz, B. S., 249 (Tryp.)
Erhardt, A., with Brock & Wilmanns, 712 (Hel.)
Ernst, A. H., with Fay & Stenburg, 1083 (Ent.)
Erwin, W. R., with Hoskins & Witt, (731) (Ent.)
Escoffery, G. S., with Hill & Rhodes, 515 (Ys.)
——, with ——, —— & Murray, 515 (Ys.)

Eskey, C. R., Prince, F. M. & Fuller, F. B., 265 (Pl.)
Esrachowitz, S. R., Friedlander, S., Radloff, G. & Saunders, S., 716 (Haem.)
Etzine, 309 (Oph.)
Eustis, E. B. & Fuller, H. S., 1108 (Typh.)
Evans, A. S. & Stirewalt, M. A., 779 (Hel.)
——, with —— & Kuntz, 64 (Hel.)
Evans, L., with McVay & Sprunt, 401 (Am.)
Evans, L. D., with Sheldon & Heyman, 772 (R.F.)
Exner, H., with Jettmar, 787 (Hel.)
Eyles, D. E., 239 (Mal.), 936 (Tryp.), 999 (Prot.)
—— & Young, M.D., 480 (Mal.)

F

Faber, B., with Møller-Christensen, 872 (Lep.)
Fabiani, G., Izzo, M. A. & Grellet, P., 671 (Mal.)
——, with Jahier, 1095 (Mal.)
——, Jahier, H. & Fulchiron, G., 485 (Mal.)
——, ——, Vargues, R. & Fulchiron, G., 486 (Mal.)
—— & Vargues, R., 670, (933) (Mal.)
——, with ——, 669, 670 (Mal.)
——, with —— & Fulchiron, 602 (Mal.)
——, ——, Fulchiron, G. & Grellet, P., 485 (Mal.)
——, ——, ——, —— & Verain, A., 484 (Mal.)
——, ——, Grellet, P. & Clausse, J., 484 (Mal.)
Fadem, R., with Cohen & Meyer, 992 (Sp.)
Faguih, with Ansari, 849 (Leish.)
Faiguenbaum, J., with Pilotti, 528 (Hel.)
Fain, A., (284), 415 (Hel.), 1005 (Ent.)
——, with Jadin, 220 (Mal.)
—— & Lagrange, E., 783 (Hel.)
——, with ——, 781 (Hel.)
——, Schoetter, M. & Ampe, R., 389 (Pl.)
Faine, S. & Hercus, C. E., 434 (Def. Dis.), 447 (Misc. Dis.)
——, with ——, 447 (Misc. Dis.)
Fair, G. M., Chang, S. L. & Richart, F. E., Jr., 480 (Mal.)
Fairbairn, H., with Culwick & Culwick, 23 (Tryp.)
Fairley, N. H., 634 (Hel.), 774 (Lep.), 1164 (Reports, etc.)
Falcone, G., 313, 800 (Oph.)
Fallis, A. M., Davies, D. M. & Vickers, M. A., 488 (Mal.)
Fan, P. C., with Hsü, Li, Wang & Huang, 878 (Hel.)
Fankhauser, R., 194 (Prot.)
de Faria, J. L., 407 (Lep.)
Fasal, P. & Gradow, A., 131 (Leish.)
Faure, L. & Lescommères, J., (695) (Am.)
Faure, P., with Gaud, 313 (Oph.)
——, with ——, Maurice & Lalu, 729 (Ent.)
Faust, E. C., 861 (Am.)
——, Agosín, M., Garcia-Laverde, A., Sayad, W. Y., Johnson, V. M. & Murray, N. A., 980 (Hel.)
Favorite, F. G., 948 (Pl.)
Fawaz, G. & Haddad, F. S., 11 (Mal.)
Fawzi, M., with Watson & Damluji, 1133 (Hel.)
Fay, R. W., with Kilpatrick, 941 (Typh.)
——, Stenburg, R. L. & Ernst, A. H., 1083 (Ent.)
——, with Sumerford, Goette, & Allred, 562 (Ent.)
Feinstein, L., (731) (Ent.)
Feld, with Siguier, Piette, Welti & Lumbroso, 882 (Hel.)
Fellers, F. X., 613, 853 (Typh.)
Felsenfeld, O., Soman, D. W., Waters, T. & Ishihara, S. J., 142 (Chl.)
Fenati, S., 611 (Typh.)
Fendall, N. R. E., 28 (Leish.)
Feng, L., with Chung & Feng, 849 (Leish.)
Feng, L. C., 252 (Leish.)
——, with Li, 324 (Ent.)
Feng, S., with Chung & Feng, 849 (Leish.)
Fernández Nafría, A., with Hens Tienda, 871 (Lep.)
—— & Hens Tienda, L., (969) (Lep.)
——, with Prieto Lorenzo, (622) (Am.)
Ferrand, G. & Parlange, J. A., 307, 445, 801 (Oph.)
Ferreira, F. S. da C., 514 (Ys.), (935) (Tryp.)
——, & Rosário, J. M., 490 (Tryp.)
Ferreira, M. O., Rachou, R. G. & Lima, M. M., 18 (Mal.)
Ferreira, T., (935) (Tryp.)
Ferrer, D. & Ribas Mujal, A., 627 (Lep.)
Ferrié, J., 186 (Oph.)
Ferris, G. F., with Stojanovich, C. J., (654) (Ent.)
Fidalgo Díaz, J., (1137) (Hel.)
Fidalgo Díaz, M. A., (1059) (Hel.)
Fiedler, O. G. H., 1103 (Tryp.)
Field, E. J., 387 (Rab.)
Field, J. W., 97 (Reports, etc.)
——, Green, R. & Byron, F. E., 911 (Reports, etc.)
Figueiredo, C., with de Freitas, (1104) (Tryp.)
Figueredo, N. & Desai, S. D., 57, 966, (Lep.)
de Figueroa Taboada, M., (804) (Misc. Dis.)
Files, V. S., 780 (Hel.)
Findland, M., with Kass & Geiman, 482 (Mal.)
Findlay, G. M., with Ampofo, 625 (Ys.), 647 (Ulc.)
—— & Howard, E. M., 672 (Mal.), 855 (Y.F.)
Findlay, M., with Grek, 717 (Haem.)
Fiol, H. & Jonquières, E. D. L., 519 (Lep.)
Fischer, O., 270 (Am.)
Fisher, O. D., 649 (Prot.)
Flannery, J. L., with Murphy, (1157) (Prot.)
Flecker, H., 643, 796, 1153 (Vms.)
Fleury, C. T. (528) (Hel.)
Floch, H., 158, 405, (776), 875, 968, 1130 *ter*, 1131 (Lep.), 236 (Mal.)
—— & Abonnenc, E., 262 (Y.F.), 908 (Ent.)
—— & Destombes, P., 154, 519, 872 (Lep.)
—— & Horth, R., 158 (775), 874 (Lep.)
—— & Lecuiller, A., 158, 874 (Lep.) (790) (Def. Dis.)
——, —— & Destombes, P., 277, 278 *bis*, 279 (Lep.)
——, —— & Sureau, P., 1129 (Lep.)
—— & Nomdedeu, G., 699 (Lep.)
da Fonseca, F., 934 (Mal.)
Fonseca, F. & Pinto, M. R., 258 (Typh.)
Forattini, O. P. & da Silva, O. J., 27 (Tryp.)
Forbes, G. B., with Harvey & Marmion 385 (Typh.)
Ford, V., with Kvittingen, Cutler, Guevara, McCullough, Rose, Tampi, Sen, Lakshwir, Khan & Dass, 967 (Lep.)
Fort, M., with Schwetz & Baumann, 783, 784 (Hel.), (1093) (Mal.)
Foster, H., Leitch, J. G. & Redstone, I., 414 (Hel.)
Foster, L., with Silverman, Elberg & Meyer, 1043 (Pl.)
Foster, L. E., with Baker, Sommer, Meyer & Meyer, 616 (Pl.)

Fouche, V. & Montestruc, E., (30) (Leish.)
Fox, W., (181) (Vms.)
Foy, H. & Kondi, A., 842 (Mal.), 1147 (Haem.)
——, —— & Hargreaves, A., 892, 1146 (Haem.)
——, ——, —— & Lowry, J., 1069 (Haem.)
Fradkin, R., with Schmidt, Loo & Hughes, 1025 (Mal.)
Frank, J. F., 531, 640 (Hel.)
Franke, H. & Horst, H. G., 193 (Prot.)
Frankel, J. W., with Schlesinger, 688 (Den.)
Franklin, M., with Bean & Daum, 298 (Def. Dis.)
Fraser, G. P. & Kermack, W. O., (115) (Mal.)
Fraser, N. M., with Gunther & Wright, 666 (Mal.)
de Freitas, J. L. P., 606, (760) *bis* (Tryp.)
—— & de Almeida, J. P., (1104) (Tryp.)
—— & Figueiredo, C., (1104) (Tryp.)
——, Neto, M. R., Nesti, A., de Andrade e Silva, U. & Lima, A. B., (759) (Tryp.)
Freitas, J. R., with de Bustamante, Pinto, Guedes & Xavier, 17 (Mal.)
Frick, L. P., with Ley, Sayer, Hobson, Vanreenen, Tipton, Ballard & Traub, 274 (Am.)
Friedemann, U., with Traub, Brasch, Huber & Kaplan, 507 (Rab.)
Friedlander, S., with Esrachowitz, Radloff & Saunders, 716 (Haem.)
Frohne, W. C., (555) (Ent.)
—— & Sleeper, D. A., (555) (Ent.)
Frumin, A. M., Waldman, S. & Morris, P., 1071 (Haem.)
Fu, H. H., Wu, Y., Wu, K. H. & Chow, Y., 161 (Hel.)
Fuchs, A., 896 (897) (Oph.)
Fueki, K., 1060 (Hel.)
Fujimoto, H., with Miyake, Oike & Amoo, (804) (Misc. Dis.)
Fujino, T., with Taniguchi, Inoki & Okuno, 263 (Den.)
Fukuda, T., 758 (Bl.)
Fukushima, K., Senda, N., Uenoyama, T., Inui, H., Ishigami, S., Kariya, A., Naka, K., Iwasaki, T. & Sakao, K., (439) (Haem.)
Fukushima, T., with Akimoto, Yasuda, Maruyama & Tsuruta, (1061) (Hel.)
Fukuzumi, S. & Obata, Y., 93, (93) (Ent.)
——, —— & Kagiwada, R., 34 (Typh.)
Fulchiron, G., with Fabiani & Jahier, 485 (Mal.)
——, with ——, —— & Vargues, 486 (Mal.)
——, with ——, Vargues & Grellet, 485 (Mal.)
——, with ——, ——, —— & Verain, 484 (Mal.)
——, with Vargues & Fabiani, 602 (Mal.)
Fuller, F. B., with Eskey & Prince, 265 (Pl.)
Fuller, H. S., with Eustis, 1108 (Typh.)
——, Murray, E. S., Ayres, J. C., Snyder, J. C. & Potash, L., 35 (Typh.)
——, with Wharton, Jenkins, Brennan, Kohls & Philip, 93 (Ent.)
Fuller, R. H., with Ryan, 77 (Haem.)
Fullmer, O. H. & Hoskins, W. M., 561 (Ent.)
Fulton, J. D., 354 (Mal.)
—— & Niven, J. S. F., 251 (Leish.)
Furman, J. E., with Workman, Hightower, Borges & Parker, 1037 (Typh.)
Furniss, A. L., (1128) (Lep.)
Furshpan, E., with Boettiger, (1158) (Ent.)
Fushimi, J., 288 (Hel.)
Fust, B., with Studer, 637 (Hel.)

G

Gabaldon, A., 1027 (Mal.)
Le Gac, P., with Heim de Balsac & Giroud, (857) (Pl.)
Gadre, S. B., with Viswanathan, 118 (Mal.)
Gagliani, M., with d'Alessandro & Mariani, 1004 (Ent.)
Gaillard, J. A., with Giroud, 680, 1035 (Typh.), 726, 907 (Prot.)
——, with ——, Le Gac & Ganzin, 1036 (Typh.)
——, with ——, ——, Rouby & Lagarde, 256 (Typh.)
Gaines, T. B. (256) (Typh.)
Galan, P., (172) (Def. Dis.)
Gallego Burín, M., 406 (Lep.)
Galliard, H. & Boutet, R., 1034 (Tryp.)
Gallut, J., 393 (Chl.)
——, with Paris, 395 (Chl.)
Gambardella, A. & de Michele, D., (511) (Am.)
Gamble, D. P., 1087 (Reports, etc.)
Ganapathipillai, A., with Reid, 1158 (Ent.)
Ganzin, M., with Giroud, Le Gac & Gaillard, 1036 (Typh.)
Gaon, J., with Murray, Pšorn, Djaković, Sielski, Broz, Ljupša, Pavlević & Snyder, 383 (Typh.)
——, with Šimović & Vesenjak-Zmijanac, 37 (Typh.)
García, E., 261 (Y.F.)
Garcia-Laverde, A., with Faust, Agosín, Sayad, Johnson & Murray, 980 (Hel.)
Garcia Sanchez, F. & Suarez Torres, G., (945) (Rab.)
Gard, S. & Magnusson, J. H., 805 (Prot.)
Garnham, P. C. C., 236, 354, 674 (Mal.), (554) (Prot.), 1086 (Reports, etc.)
Garrett, A. S., 156 (Lep.)
Garrett-Jones, C., 91 (Ent.), 483 (Mal.)
Garrison, S. C., 615 (Rab.)
Garry, M. W. & Koch, M. L., 448 (Misc. Dis.)
Gartrell, F. E., with Derryberry, 930 (Mal.)
Gaspard, with Jussiant, (848), (Tryp.)
Gaté, J., 631 (Lep.)
Gatti, J. C., with Basombrío, Cardama, Colombo & Wilkinson, 57 (Lep.)
Gatti, J. C., with Negroni, Cardama & Baliña, 646 (Der.)
Gaud, J. & Faure, P., 313 (Oph.)
—— & Jaubertie, R., 776 (Hel.)
——, Maurice, A., Faure, P. & Lalu, P., 729 (Ent.)
Gauld, R. L. & Goodner, K., 33 (Typh.)
Gayot, G., Choquette, L. P. E. & Poul, J. 506 (Rab.)
Gear, J., Wolstenholme, B., Harwin, R. & Stakes, F. H., 1107 (Typh.)
Gee, F. L., with Holmes & Kyobe, 174 (Haem.)
——, with ——, Stanier, Semambo, Jones & Kyobe, 535 (Def. Dis.)
Geiman, Q. M., with Kass & Finland, 482 (Mal.)
Geiser, M., with King, Bartholomew, Ventura, Wooton, Macfarlane, Donaldson & Sisson, 437 (Haem.)
Gelfand, M., 436 (Def. Dis.), 611 (Typh.)
—— & Barnett, E. E., 1074 (Misc. Dis.)
Gemar, F., with Ross, 58, 627 (Lep.)
Georg, L. K., Ajello, L. & Gordon, M. A., 183 (Der.)
Georgiev, B., with Pavlov, (1005) (Ent.)
Georgopoulos, G., 653 (Ent.), 928 (Mal.)

Gerber, J. H., 875 (Hel.)
Gerdener, J. L., with Le Riche, Riordan, Smit, Ockerse, Best, Kinnear, Walker, du Toit Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Gerebtzoff, M. A., with Rodhain, 192 (Prot.)
Germain, A. & Cluzel, P., 401 (Am.)
Germano, A., with Jaunin, (565) (Ent.)
Gersdorff, W. A., with Mitlin & Nelson, 453 (Ent.)
——, Nelson, R. H. & Mitlin, N., 563 (Ent.)
Gervois, M., with Coutelen, Cochet, Biguet & Mullet, 970 (Hel.)
Ghosal, S., with Das, Gupta & Chaudhuri, 691 (Chl.)
Ghosal, S. C., 1155 (Ulc.)
——, with Seal & Bose, (46) (Pl.)
—— with —— & Ghosh, 395 (Chl.)
Ghose, B. K., with Mookerjee, (992) (Haem.)
Ghosh, K. K., (1139) (Hel.)
——, Dharmendra & Dey, N. C., 520 (Lep.)
Ghosh, M. M., with Seal & Ghosal, 395 (Chl.)
Giboin, L. M., 443 (Vms.)
Gibson, C. L., 984 (Hel.)
——, & Ascoli, W. F., 1144 (Hel.)
Gibson, J. B. G., 445 (Oph.)
Gibson, J. M., (210) (Reports, etc.)
Giglioli, G., 662 (Mal.)
Gillett, J. D., 260 (Y.F.), 728 (Ent.)
——, with Haddow, van Someren, Lumsden & Harper, 85 (Ent.)
Gillikin, C. M., with Sodeman, Doerner & Gordon, 50 (Am.)
Gillman, J. & Gillman, T., 1166 (B.R.)
Gillman, T., with Gillman, 1166 (B.R.)
Gilmour, D., with Mackerras, Ratcliffe & Mules, 119 (Mal.)
Gilroy, A. B., 844, 1025 (Mal.), 987 (Def. Dis.)
Ginsburg, J. M., 94 (Ent.)
Girard, G., 617, 770 (Pl.), 700 (Lep.)
Girgis, B. & Magid, A., 635 (Hel.)
Giroud, P., 383 (Typh.)
——, with Baylon, Bloch & Coumel, 613 (Typh.)
—— & Ciaccio, G., 32 (Typh.)
—— & Gaillard, J. A., 680, 1035 (Typh.), 726, 907 (Prot.)
—— & Grjebine, A., 254 (Typh.)
——, with Heim de Balsac & Le Gac, 255 (Typh.), (857) (Pl.)
——, with Justin-Besançon & Cornet, 384 (Typh.)
——, Jadin, J. & Reizes, C., 32 (Typh.)
——, with Le Gac, 35 (Typh.)
——, with —— & Baup, 498 (Typh.)
——, with ——, Chamard & Reizes, 36 (Typh.)
——, Le Gac, P., Brizard, H. & Laurent, C., 1106 (Typh.)
——, ——, Ganzin, M. & Gaillard, J. A., 1036 (Typh.)
——, with Le Gac, le Henaff & Baup, 682 (Typh.)
——, with ——, Rouby & Lagarde, (386) (Typh.)
——, Le Gac, P., Rouby, M., Lagarde, J. & Gaillard, J. A., 256 (Typh.)
——, with Worms, Péquignot & Israël, 383 (Typh.)
—— & Yassemi, H., 683 (Typh.)
Gjullin, C. M. & Peters, R. F., 1080 (Ent.)
Glasgow, J. P. & Duffy, B. J., 125 (Tryp.)
Glorieux, E., (923) (Mal.)
Glücker, L. G. & Munk, J., 1039 (Typh.)
Goble, F. C., 938 (Tryp.)
Goel, L. N., 180 (Ep. Dropsy)
de Góes, P. & Lobo, M. B., 607 (Tryp.)
Goeters, W., 789, 985 (Hel.)
Goette, M. B., with Sumerford, Fay & Allred, 562 (Ent.)
——, with ——, Quarterman & Schenck, 91 (Ent.)
Gohar, M. A., 1049 (Lep.)
——, Eissa, A. A. & Sebai, I., 878 (Hel.)
Gokhale, B. B., with Gollerkeri & Ranade, 1049 (Lep.)
Goldberg, W. M. & Lymburner, R., 284 (Hel.)
Goldman, C., with Divo & Lugo, 508 (Rab.)
Goldman, L., 1078 (Ent.)
——, Rockwell, E. & Richfield, D. F., 1077 (Ent.)
Gollerkeri, P. G., Gokhale, B. B. & Ranade, S. N., 1049 (Lep.)
Gomes, L. de S. 152 (Ys.)
Gómez Barry, H., with de Velasco Guzmán & Amado Ledo, 511 (Am.)
Gómez Orbaneja, J., 628 (Lep.)
Gongora Triay, B., 329 (Reports, etc.)
González Barranco, D., 171 (Hel.)
González Prendes, M. A., (964), (965) (Lep.)
——, with Ybarra Pérez, 277, 965 (Lep.)
Goodey, T., (67) (Hel.)
Goodner, K., with Gauld, 33 (Typh.)
Goodwin, L. G., (554) (Prot.), 664 (Mal.), (1165) (Reports, etc.)
van Goor, W. T. & Lodens, J. G., 930 (Mal.)
Goodrich, B. E., with Reeder, 997 (Misc. Dis.)
Gopal, B., 692 (Chl.)
Gopalan, C., Venkatachalam, P. S., Rao, K. S. & Menon, P. S., 987 (Def. Dis.)
Gordin, R., with von Bonsdorff, 418 (Hel.)
Gordon, C. C., with Shoucair, Grant & Hill, (1155) (Der.)
Gordon, E. M., with Sodeman, Doerner & Gillikin, 50 (Am.)
Gordon, M. A., with Georg & Ajello, 183 (Der.)
Gordon, R. M., with Muirhead-Thomson & Davey, 1006 (Ent.)
—— & Griffiths, R. B., 1055 (Hel.)
Gorgas Memorial Institute, 99, 1088 (Reports, etc.)
Gosford, B., with Ercoli, Carminati, Kley & Schwartz, 249 (Tryp.)
Gossard, W. H., with Lindsay & Chapman, 620 (Am.)
Goto, G., with Kitaoka, Shishido, Kato & Yoshida, 257 (Typh.)
Grabstald, H. & Swan, L. L., 1128 (Lep.)
Gradow, A., with Fasal, 131 (Leish.)
Granett, P., Connola, D. P. & Lembach, J. V., 94 (Ent.)
Grant, L. S., with Shoucair, Gordon & Hill, (1155) (Der.)
Grassi, C. & Kåss, E., (1158) (Prot.)
Gray, J. A. B. & Smith, F. E., 722 (Heat Str.)
Green, F. D., with Sutcliff & Suter, 400 (Am.)
Green, R., with Field & Byron, 911 (Reports, etc.)
Green, T. W. & Conley, C. L., 177 (Haem.)
Greenberg, J., with Josephson, Taylor & Bami, 115 (Mal.)
——, with Taylor, 1045 (Am.)
——, with —— & Josephson, 1122 (Am.)
——, with ——, —— & Coatney, 674 (Mal.)
——, Trembley, H. L. & Coatney, G. R., 122 (Mal.)
——, with Trembley & Coatney, 122 *bis* (Mal.)
Greene, R. A. & Breazeale, E. L., 1067 (Hel.)
Greenslit, F. S., with Conn, 980 (Hel.)
Greiff, D. & Pinkerton, H., 609 (Typh.)
Greiner, H., 884 (Hel.)

Grek, I. J. & Findlay, M., 717 (Haem.)
Grellet, P., with Fabiani & Izzo, 671 (Mal.)
——, with ——, Vargues & Clausse, 484 (Mal.)
——, with ——, —— & Fulchiron, 485 (Mal.)
——, with ——, ——, —— & Verain, 484 (Mal.)
Gremliza, L., 732 (Reports, etc.)
Grenier, P. & Taufflieb, R., (911) (Lab.)
Griffith, R. L., 1068 (Def. Dis.)
Griffiths, R. B., with Gordon, 1055 (Hel.)
Grillo, E. M., with Moutinho & de Moura, 548 (Oph.)
Grjebine, A., with Giroud, 254 (Typh.)
Groot, H., Renjifo, S. & Uribe, C., 760 (Tryp.)
Gross, B., Baker, R. H. & Bonnet, D. D., 509 (Pl.)
——, with Bonnet & Mau, 510 (Pl.)
Grundmann, A. W., Newson, H. D. & Warnock, R. G., (1102) (Mal.)
Guedes, A. S. with de Bustamante, Pinto, Xavier & Freitas, 17 (Mal.)
Guelmino, D. J., 224 (Mal.)
Guevara, J. A., with Kvittingen, Cutler, McCullough, Rose, Ford, Tampi, Sen, Lakshwir, Khan & Dass, 967 (Lep.)
Guevara, R., (313) (Oph.)
Guggenheim, K., 595 (Mal.)
—— & Halevi, S., 772 (R.F.)
Guggisberg, C. A. W., with Heisch, (1005) (Ent.)
Guha, P. C., with Neelakantan & Iyer, (115), (116) (Mal.)
Guicherit, I., with Blumberg & McGiff, 838 (Mal.), 979 (Hel.)
Guillaume, A. & Meyer, A., (807) (Ent.)
Guimarães, F. N., 1105 *bis* (Leish.), 1155 (Der.)
Guimaraes, J. L. & Lourie, E. M., 126 (Tryp.)
Guimarães, J. P., with Torres, Duarte & Moreira, 720 (Der.)
Guimarães, N., 1127 (Lep.)
Guinto, R. S., Doull, J. A., Bancroft, H. & Rodriguez, J. N., 54 (Lep.)
Gunnison, J. B., Larson, A. & Lazarus, A. S., 45 (Pl.)
Gunstone, F. D. & Heggie, R. M. (786) *bis* (Hel.)
Gunther, C. E. M., Fraser, N. M. & Wright, W. G., 666 (Mal.)
Gupta, S. K., with Das, Ghosal & Chaudhuri, 691 (Chl.)
Gurd, D. P., (311) (Oph.)
Gürevin, I., 976 (Hel.)
Gurkirpal Singh & Ahuja, M. L., 949 (Chl.)
Guth, with Crozes, 904 (Ulc.)
Guthe, T., with Reynolds & Samame, 152 (Ys.)
Gutiérrez Ballesteros, E. & Treviño Villaseñor, A., 511 (Am.)
Gutiérrez F., J., Neghme R., A. & Albí de la Fuente, H., 121 (Mal.)
Gvozdenović, M. & Nevenić, V., 607 (Leish.)
Gyrisco, G. G., with Hopkins & Norton, (910) (Ent.)

H

Haas, B., with Haas, (357) (Mal.)
Haas, R., 501 (Typh.)
Haas, W. & Haas, B., (357) (Mal.)
Hack, W. H., (453) (Ent.)
Hackett, C. J., 741 (B.R.)
Hackett, L. W., 1026 (Mal.)
Hadaway, A. B. & Barlow, F., 1006 (Ent.)
——, with Barlow, 557, 1084 (Ent.)
Haddad, F. S., with Fawaz, 11 (Mal.)
Haddow, A. J., 730 (Ent.)
——, Dick, G. W. A., Lumsden, W. H. R. & Smithburn, K. C., 260 (Y.F.)
——, van Someren, E. C. C., Lumsden, W. H. R., Harper, J. O. & Gillett, J. D., 85 (Ent.)
Hadler, W. A., 412 (Lep.), 644 (Der.)
——, with Mauri & Carvalho, 412 (Lep.)
Haedicke, T. A., Reagan, R. L., Schenck, D. M. & Brueckner, A. L., 966 (Lep.)
Hahn, F. E., with Wisseman, Jackson, Bozeman & Smadel, 681 (Typh.)
——, with ——, ——, Ley & Smadel, 134 (Typh.)
Hahn, R. G., 43 (Y.F.)
Haiba, M. H. & Williamson, J., 806 (Prot.)
Halawani, A., 83 (Misc. Dis.)
——, Abdallah, A. & El Kordy, M. I., 620 (Am.)
——, El Dine, K. Z. & El Fiki, A. Y., 1038 (Typh.)
Halbron, P., (311) (Oph.)
Hale, W. H., with Eddleman & Snowden, 229 (Mal.)
Halevi, S., with Guggenheim, 772 (R.F.)
Halgeri, A. V., with Viswanathan, Ramachandra Rao & Karandikar, 359 (Mal.)
Hall, W. H. & Loomis, G. W., 838 (Mal.)
Hall, W. J., 201 (Ent.)
Halpern, B., with Dolkart & Cullen, 270 (Am.)
Halstead, B. W., with Ryckman, (1162) (Ent.)
Hamilton, H. E., with Zavala, 862 (Am.)
Hanafy, M., 535 (Def. Dis.)
Handousa Bey, A., (163) (Hel.)
Hanks, J. H., 969 (Lep.)
——, with Backerman, T. & Barrett, R., 280 *bis* (Lep.)
Hansen, E. L. & Bennett, B. M., 866 (Am.)
Hanson, R. O. & Tatum, A. L., 846 (Mal.)
Harada, F., (1137) (Hel.)
——, Miyagawa, F., Sukegawa, N., Tuboi, T. & Nozawa, R., 139 (Pl.)
Harant, H., Huttel, W. & Huttel, N., (556) (Ent.)
Hargreaves, A., with Foy & Kondi, 892, 1146 (Haem.)
——, with ——, —— & Lowry, 1069 (Haem.)
Harinasuta, C., 51 (Am.)
Harington, C. R., 1145 (Haem.)
Harman, J. B., (1110) (Typh.)
Harper, J. O., with Haddow, van Someren, Lumsden & Gillett, 85 (Ent.)
Harris, B. P., (853) (Typh.)
Harris, F. C., 878 (Hel.)
Harris, R. S., 891 (Def. Dis.)
Harrison, C. M., 467, 560, 1006 (Ent.)
Harrison, I. B. & Whittington, R. M., 513 (R.F.)
Harrison, J. L., (941) (Typh.)
—— & Audy, J. R., 764 *bis* (Typh.)
—— with Audy & Wyatt-Smith, 135 (Typh.)
Harrison, R. A., (1083) (Ent.)
Hartmann-Heyn, E., with Herzberg, Urbach & Lück, 40, 500 (Typh.)
Hartzell, A., (1005) (Ent.)
Harvey, A. E. C., with Heisch, 513 (R. F.)
Harvey, M. S., Forbes, G. B. & Marmion, B. P., 385 (Typh.)
Harwin, R., with Gear, Wolstenholme & Stakes, 1107 (Typh.)
Haseeb, M. A., 971 (Hel.)
Hashimoto T., with Akimoto & Kubo, (1061) (Hel.)

Haskins, W. T., with Luttermoser, Coleman & Jumper, 697 (Am.)
Hass, H. B., Neher, M. B. & Blickenstaff, R. T., (454) (Ent.)
Hassett, C. C. & Jenkins, D. W., 1079 (Ent.)
Havlík, O., 554 (Prot.)
—— & Rosický, B., (1021) (Mal.)
Hawking, F., 354 (Mal.), 890 (Hel.)
——, Ormerod, W. E., Thurston, J. P. & Webber, W. A. F., 1143 (Hel.)
—— & Thurston, J. P., 931 (Mal.), 1141 (Hel.)
Hayman, R. W., with Swynnerton, 331 (Reports, etc.)
Heggie, R. M., with Gunstone, (786) *bis* (Hel.)
Heim de Balsac, H., Le Gac, P. & Giroud, P., 255 (Typh.), (857) (Pl.)
Hein, W., 906 (Prot.)
Heinz, H. J., 592, (1094) (Mal.)
Heisch, R. B., 200 (Ent.), 489 (Tryp.)
—— & Guggisberg, C. A. W., (1005) (Ent.)
—— & Harvey, A. E. C., 513 (R.F.)
Heldrich, F. J., Jr., 177 (Haem.)
van Hell, J. C., (361) (Mal.)
Helluy, J. R. & Schwartz, J., 858 (Am.)
Hellwig, C. A., with Peckenschneider & Pokorny, (909) (Ent.)
Helmons, J., with Dierckx, 438 (Haem.)
Helo, J. E., 957 (Am.)
Henrard, C., 847 (Tryp.)
Henry, A. F. X., 252 (Leish.)
Henry, A. J., Mansour, R., Watson, A. G. & Zaki, A. H., 851 (Leish.)
Henry-Eveno, J., with Levaditi & Vaisman, (856) *bis* (Rab.)
Hens Tienda, L. & Fernández Nafria, A., 871 (Lep.)
——, with ——, (969) (Lep.)
Henze, S., 698 (R.F.)
Hercus, C. E. & Faine, S., 447 (Misc. Dis.)
——, with Faine, 434 (Def. Dis.), 447 (Misc. Dis.)
Herdt, J. R., Loomis, L. N. & Nolan, M. O., 159 (Hel.)
Herin, V., (1033) (Tryp.)
Herms, W. B., 335 (B.R.)
Hernández, S., with Pérez Gallardo & Clavero, 938 (Typh.)
Hernández Morales, F., with Diéz Rivas & Meyer, 793 (Sp.)
——, with ——, Suárez & Pérez Santiago, 991 (Sp.)
Herrera, G., 631 (Lep.)
Hertzog, A. J., with Wasserman & Phelps, 1070 (Haem.)
Herzberg, K. & Urbach, H., with Lück, G. & Hartmann-Heyn, E., 40, 500 (Typh.)
Hess, A. D., 1159 (Ent.)
Heuck, F., with Diethelm & Kloos, 978 (Hel.)
Heuls, J., 166 (Hel.)
Heyman, A., with Sheldon & Evans, 772 (R.F.)
Hiernaux-L'Hoëst, D., with van Riel & Hiernaux-L'Hoëst, 374 (Mal.)
Hiernaux-L'Hoëst, J., with —— & ——, 374 (Mal.)
Hightower, J. A., with Workman, Borges, Furman & Parker, 1037 (Typh.)
Hill, C. H., 431 (Hel.)
Hill, F. S. & Davis, B. C., 1153 (Haem.)
Hill, K. R., 515 (Ys.)
——, Rhodes, K. & Escoffery, G. S., 515 (Ys.)
——, ——, —— & Murray, C. C., 515 (Ys.)
Hill, K. R., Rhodes, K., Stafford, J. L. & Aub, R., 437 (Def. Dis.)
——, with Shoucair, Gordon & Grant, (1155) (Der.)
Hills, G. M. & Spurr, E. D., 509 (Pl.)
Himsworth, H. P., 205 (Reports, etc.)
Hines, V. D., with Morlan, 34 (Typh.)
Hirakawa, Y., with Maki, (1061) (Hel.)
Hishinuma, Y., with Hunter, Ritchie, Kaufman, Pan, Yokogawa, Ishii, Szewczak, Weber, Asakura & Williams, 633 (Hel.)
—— with Ritchie, Hunter, Kaufman, Pan, Nagano, Yokogawa, Szewczak, Shimizu & Asakura, 881 (Hel.)
——, with Ritchie, Hunter, Pan, Szewczak, Izum Weber & Asakura, 523 (Hel.)
Ho, E. A., with Soong, 761, 851 (Leish.)
Hoare, C. A., 693 *bis* (Am.), 1086 (Reports, etc.)
——, with Neal, 859 (Am.)
Hobson, A. C. S., with Ley, Sayer, Vanreenen, Tipton, Frick, Ballard & Traub, 274 (Am.)
Hobson, A. D., Stephenson, W. & Beadle, L. C., (707) (Hel.)
——, —— & Eden, A., (707) (Hel.)
Hocking, B. & Richards, W. R., 1082 (Ent.)
Hodge, E. H. V., 565 (Reports, etc.)
Hoekenga, M. T., 425, 1139 (Hel.), 771 (Am.), 1097 (Mal.)
Hoeppli, R., 209 (Reports, etc.)
—— & Li, F., 700 (Hel.)
Hoffman, D. O. & Zakhary, R., 525 (Hel.)
Hoffman, R. A. & Lindquist, A. W., 910 (Ent.)
——, —— & Butts, J. S., 88 (Ent.)
——, with Lindquist, Roth & Butts, 561 (Ent.)
——, Roth, A. R. & Lindquist, A. W., 452 (Ent.)
Hoffman, R. A., Roth, A. R., Lindquist, A. W. & Butts, J. S., (808) (Ent.)
Holdenried, R., 769, 1113 (Pl.)
Holmes, E. G. & Gee, F. L., with Kyobe, J., 174 (Haem.)
——, Stanier, M. W., Semambo, Y. B. & Jones, E. R., with Kyobe, J. & Gee, F. L., 535 (Def. Dis.)
Holmes, M. A., with Clark, Romer, Welsh, Lennette & Abinanti, 38 (Typh.)
——, with Lennette & Abinanti, 767 (Typh.)
——, with ——, Dean, Abinanti, Clark & Winn, 39 (Typh.)
Holstein, M. H., 105 (Mal.)
Holstein, M. M., with Puyuelo, 71 (Hel.)
Holway, R. T., (204) (Ent.)
——, Mitchell, W. A. & Salah, A. A., 729 (Ent.)
Holz, J., 904 (Prot.)
——, with Schmidt-Hoensdorf, 1000 (Prot.)
Hood, M., (883) (Hel.)
Hoogstraal, H. & Knight, K. L., 40 (Y.F.)
Hopkins, G. H. E. & Clay, T., (1162) (Ent.)
Hopkins, L., Norton, L. B. & Gyrisco, G. G., (910) (Ent.)
Horack, H. M., with Simmons, Whayne, Anderson, Thomas & collaborators, 741 (B.R.)
Hornbostel, H. & Dörken, H., 703 (Hel.)
——, with Prévot & Dörken, 636 (Hel.)
Horne, G. O. & Mole, R. H., 82 (Heat Str.)
Horrax, G., with Ross & Norcross, 973 (Hel.)
Horst, H. G., with Franke, 193 (Prot.)
Horth, R., with Floch, 158, (775), 874 (Lep.)
Hoskins, W. M., with Fullmer, 561 (Ent.)
—— with Perry, 561 *bis* (Ent.)
——, Witt, J. M. & Erwin, W. R., (731) (Ent.)

Hotta, S., 687 *bis* (Den.)
Hottle, G. A., Morgan, C., Peers, J. H. & Wyckoff, R. W. G., 264 (Rab.)
Hou, T., with Chung, Huang & Weng, 66 (Hel.)
Houwink, A. L., with Kraneveld & Keidel, 848 (Tryp.)
Howard, E. M., with Findlay, 672 (Mal.), 855 (Y.F.)
Howie, J., 404 (Lep.)
Hoyem, H. M., with Bozicevich, Tobie, Thomas & Ward, 431 (Hel.)
Hrenoff, A. K., with Anderson, Anderson, Nakamura & Contopoulos, 1121 (Am.)
Hsü, H. F., Li, S. Y., Wang, C. K., Fan, P. C. & Huang, T. C., 878 (Hel.)
Huang, S., 1021 (Mal.)
Huang, T., with Chung, Hou & Weng, 66 (Hel.)
Huang, T. C., with Hsü, Li, Wang & Fan, 878 (Hel.)
Huard, P., Vu-Cong-Hoe & Tran-Anh, 888 (Hel.)
Huber, W., with Traub, Friedemann, Brasch & Kaplan, 507 (Rab.)
Huebner, R. J., with Luoto & Winn, 767 (Typh.)
Hueck, O., (977) (Hel.)
Hughes, H. B., with Schmidt, Loo & Fradkin, 1025 (Mal.)
Hughes, L. E., with Larson, Philip & Wicht, 265 (Pl.)
Hughes, M. H., 565 (Reports, etc.) 708 (Hel.)
—— & Daley, P. F., 168 (Hel.)
Hughes, T. E., (983) (Hel.)
Humphreys, J., with Jelliffe, 553 (Misc. Dis.), 1152 (Haem.)
Humphry, A. H., 871 (Lep.)
Hunninen, A. V., 373 (Mal.)
Hunter, G. W., Kaufman, E. H., Jr. & Pan, C., 879 (Hel.)
——, Ritchie, L. S., Chang, I. C. *et al.*, 1050 (Hel.)
——, ——, Kaufman, E. H., Pan, C., Yokogawa, M., Ishii N. & Szewczak, J. T., with Weber, R. E., Asakura, S., Hishinuma, Y. & Williams, F., Jr., 633 (Hel.)
——, with ——, Kaufman, Pan, Nagano, Yokogawa, Szewczak, Hishinuma, Shimizu & Asakura, 881 (Hel.)
——, ——, Pan, C. & Lin, S., 1050 (Hel.)
——, with ——, Pan, Szewczak, Izumi, Weber, Hishinuma & Asakura, 523 (Hel.)
——, ——, Nagano, K. & Ishii, N., with Murakuni, R., Pan, C., Weber, R. E., Szewczak, J. T. & Asakura, S., 523 (Hel.)
——, —— & Tanabe, H., 416 (Hel.)
——, ——, ——, Nagano, K., Pan, C. & Yokogawa, M., 785 (Hel.)
Hurlbut, H. S., Altman, R. M. & Nibley, C., Jr., 565 (Ent.)
Hurst, R. O. & Butler, G. C., 306 (Vms.)
Hussain, M. Z. Y., 227 (Mal.)
Hutner, S. H. & Provasoli, L., 460 (B.R.)
Huttel, N., with Harant & Huttel, (556) (Ent.)
Huttel, W., 82 (Ulc.), 621 (Am.)
——, with Harant & Huttel, (556) (Ent.)

I

d'Ignazio, C., 131 (Typh.)
Ikeda, K. & Toyama, M., 803 (Oph.)
Ikuzawa, M., with Tanaka & Moriya, (857), (Pl.)
——, with ——, —— & Sumiyoshi, (857) (Pl.)
Inder Singh & Kalyanum, T. S., 1096 (Mal.)
Indian Med. Gaz., 1155 (Ulc.)
Indonesia, Ministry of Health of, 8 (Mal.)
Innella, F., 960 (Ys.)
Innes, J. R., 774, 963 (Lep.)
Innes, J. R. M. & Shoho, C., 1137 (Hel.)
Innes, R. R., 1111 (Pl.)
Inoki, S., 370, 373 (Mal.)
——, Okuno, Y. & Aoyama, A., 370 (Mal.)
——, with Taniguchi, Fujino & Okuno, 263 (Den.)
Inoue, H., with Kitaoka, 133 (Typh.)
Inst. Roy. Colonial Belge Bull. des Séances, 364 (Mal.)
Intengan, C. L., with Burch, Salcedo & Carrasco, 791 (Def. Dis.)
——, with Salcedo, Regala, Pascual, Santiago, Bautista, Bocobo & Concepcion, (75) (Def. Dis.)
Inui, H., with Fukashima, Senda, Uenoyama, Ishigami, Kariya, Naka, Iwasaki & Sakao, (439) (Haem.)
Inzerillo, R., with Arcuri, 699 (Lep.)
Irons, J. V., Eads, R. B., Johnson, C. W., Walker, O. L. & Norris, M. A., 499 (Typh.)
Ishigami, S., with Fukushima, Senda, Uenoyama, Inui, Kariya, Naka, Iwasaki & Sakao, (439) (Haem.)
Ishihara, K., with Misao, Yamaoka, Yamada & Kimura, 944 (Den.)
Ishii, N., with Hunter, Ritchie, Kaufman, Pan, Yokogawa, Szewczak, Weber, Asakura, Hishinuma & Williams, 633 (Hel.)
——, with ——, ——, Negano, Murakuni, Pan, Weber, Szewczak & Asakura, 523 (Hel.)
——, with McMullen, Komiyama, Endo-Itabashi & Mitoma, 415 (Hel.)
——, with ——, ——, ——, Ozawa, Asakawa & Mitoma, 416 (Hel.)
Ishihara, S. J., with Felsenfeld, Soman & Waters, 142 (Chl.)
Ishimura, K., with Sasa, (87) (Ent.)
Israël, L., with Worms, Giroud & Péquignot, 383 (Typh.)
Itano, H. A., with Neel & Wells, 176 (Haem.)
——, with Sturgeon & Valentine, 718 (Haem.)
Itô, T., with Itô & Sasaki, 186 (Oph.)
——, with Kitaoka, Shishido, Kato, Katsura, Tatami 'Matsuzawa & Machida, 257 (Typh.)
Itô, Y., Itô, T. & Sasaki, Y., 186 (Oph.)
Iwasaki, T., with Fukushima, Senda, Uenoyama, Inui, Ishigami, Kariya, Naka & Sakao, (439) (Haem.)
Iwashige, Y., with Mitsui, Tanaka & Yamashita, 307 (Oph.)
Iyer, B. H., with Neelakantan & Guha, (115), (116) (Mal.)
Izumi, S., 1058 (Hel.)
——, with Ritchie, Hunter, Pan, Szewczak, Weber, Hishinuma & Asakura, 523 (Hel.)
Izzo, M. A., with Fabiani & Grellet, 671 (Mal.)

J

Jack, I. B., (804) (Prot.)
Jackson, C. H. N., with Potts, 1030 (Tryp.)
Jackson, E. B., 137 (Typh.)
——, with Wisseman, Hahn, Bozeman & Smadel, 681 (Typh.)
——, with ——, ——, Ley & Smadel, 134 (Typh.)

Jackson, J. H., 1068 (Def. Dis.)
Jackson, R. B., 8 (Mal.)
Jacob, V. P., 107 (Mal.)
——, with Kalra, 869 (R.F.)
Jacobs, E. C., 533 (Def. Dis.)
Jacobson, S., with Becker, 161, 419 (Hel.)
Jacocks, W. P., with Chellappah, 340 (B.R.)
Jacquemin, P., with Mandoul, 233 (Mal.)
Jadin, J., 928 (Mal.)
—— & Fain, A., 220 (Mal.)
——, with Giroud & Reizes, 32 (Typh.)
Jaffé, L., 551 *bis* (Misc. Dis.)
Jahier, H. & Fabiani, G., 1095 (Mal.)
——, with —— & Fulchiron, 485 (Mal.)
——, with ——, Vargues & Fulchiron, 486 (Mal.)
Jahnes, W. G., Jr., with Burrows, 1123 (Am.)
James, C. S., (567) (Reports, etc.)
James, H. A., with Rockenmacher & Elberg, 1112 (Pl.)
James, T., 891 (Hel.)
Jamnback, H., 1162 (Ent.)
Jampol, J., with Murray, Cohen, Ofstrock & Snyder, 681 (Typh.)
Janaki, L., with Najib Khan, Nair & Suri, 663 (Mal.)
Jansen, J., with Pacheco, 415 (Hel.)
Janssen, P., 281 (Hel.)
——, with van den Berghe, 304 (Haem.)
Janssen, P. J., with Chardome, 1095 (Mal.)
Japan Logistical Command Bull., 1050 *bis*, 1051 (Hel.)
Jacques, W. E., 979. (979) (Hel.)
Jarpa, A., Agosin, M., Christen, R. & Atias, A. V., 128 (Tryp.)
——, with Agosin, Christen, Atias & Neghme, 849 (Tryp.)
——, with Christen, Agosin & Atias, 128 (Tryp.)
——, with ——, ——, Pino, Thiermann & Neghme, (650) (Prot.)
——, with Neghme, Badínez, Thiermann, Agosin & Christen, 1104 (Tryp.)
Jaskoski, B. J., (1061) (Hel.)
Jaswant Singh, 9, 1099 (Mal.)
—— & Nair, C. P., 122 (Mal.)
——, —— & Basu, P. C., 122 (Mal.)
——, ——, —— & Ray, A. P., 19 (Mal.)
——, Nair, C. P. & David, A., 674 (Mal.)
——, with Nair & Ray, 1100 (Mal.)
——, Pal, R. & Sharma, M. I. D., 753 (Mal.)
—— & Raghaven, N. G. S., 70 (Hel.)
——, Ray, A. P. & Nair, C. P., 369 (Mal.)
——, with Ray, Nair & Basu, 1100 (Mal.)
Jaubertie, R., with Gaud, 776 (Hel.)
Jaunin, R. & Germano, A., (565) (Ent.)
de Jaureguiberry, P., with Brygoo, 724 (Misc. Dis.)
Javett, S. N., with Rabkin, 554 (Prot.)
Jawad, H., (1060) (Hel.)
Jayesekera, H. T. W., de Mel, B.V. & Cullumbine, H., 436 (Def. Dis.)
Jayasundera, L. B. T., with Schmid & Velaudapillai, 1109 (Typh.)
Jayewickreme, S. H., with Rajendram, 667 *bis*, 749 (Mal.)
Jeffery, G. M., 840, 1094, (Mal.)
——, with Ramarkrishnan, Young, Burgess & McLendon, 924 (Mal.)
Jelliffe, D. B., 53 (Ys.), 565 (Reports, etc.), (643), 1151 (Haem.), 855 (Y.F.), 1076 (Misc. Dis.)
Jelliffe, D. B. & Humphreys, J., 553 (Misc. Dis.), 1152 (Haem.)
——, with Silvera, 714 (Def. Dis.)
Jenkins, D. W., with Hassett, 1079 (Ent.)
——, with West, (555) (Ent.)
——, with Wharton, Brennan, Fuller, Kohls & Philip, 93 (Ent.)
Jenkins, V. E. & Postlewaite, J. C., 544 (Der.)
Jensen, F. W., with Lennette & Clark, 500 (Typh.)
——, with ——, —— & Toomb, 1039 (Typh.)
Jettmar, H. M. & Exner, H., 787 (Hel.)
Jírovec, O., 710 (Hel.), 811 (Reports, etc.)
——, with Vaněk, 908 (Prot.)
Jo, K., with Kitaoka, Takemori & Shishido, 610 (Typh.)
Johnson, C. W., with Irons, Eads, Walker & Norris, 499 (Typh.)
Johnson, P. T., with Traub, (654) (Ent.)
Johnson, V. M., with Faust, Agosín, Garcia-Laverde, Sayad & Murray, 980 (Hel.)
Johnstone, R. M., 300 (Haem.), 361 (Mal.)
Jonchère, H., 490 (Tryp.)
——, with Pfister, R., 590 (Mal.)
Jones, B. R., (556) (Ent.)
Jones, E. R., with Holmes, Stanier, Semambo, Kyobe & Gee, 535 (Def. Dis.)
Jones, E. S., with Maegraith & Andrews, 111 (Mal.)
——, Maegraith, B. G. & Sculthorpe, H. H., 756, 757 (Mal.)
Jones, L. R. & Riddick, J. A. (731) (Ent.)
Jones, M. F., 1121 (Am.)
Jones, T. W. T., 107, 667 *bis* (Mal.)
Jones, W. R., 866 (Am.)
——, Landquist, J. K. & Senior, N., 1119 (Am.)
Jonquières, E. D. L., with Fiol, 519 (Lep.)
——, with Malfatti, 775 (Lep.)
Joseph, A. A., with Loughlin, 53 (Ys.)
——, with ——, Rappaport & Mullin, 424 (Hel.)
——, with ——, ——, ——, Wells & Shookhoff, 712 (Hel.)
——, with ——, Rice, Wells, Rappaport & Rene, 751 (Mal.)
Josephson, A. M., with Chernoff, 77 (Haem.)
Josephson, E. S., Greenberg, J., Taylor, D. J. & Bami, H. L., 115 (Mal.)
——, with Taylor & Greenberg, 1122 (Am.)
——, with ——, —— & Coatney, 674 (Mal.)
Joselevitch, M., Kleimans, M. & Zwaig, G., (1071) (Haem.)
Joulia, P., Petges, G. & Texier, 403 (Lep.)
J. Parasitology, 330 (Reports, etc.)
Joyeux, C., with Blanc & Bruneau, 259 (Typh.)
Jucovsky, J., 411 (Lep.)
Juillan, M., with Collignon, 476 (Mal.)
Jumper, J. R., with Luttermoser, Haskins & Coleman, 697 (Am.)
Juneja, M. R., with Viswanathan & Ramachandra Rao, 118 (Mal.)
Jung, R. C., with Sodeman, 527 (Hel.)
Jussiant & Gaspard, (848) (Tryp.)
Justin-Besançon, L., Cornet, A. & Giroud, P., 384 (Typh.)

K

Kaether, H., with Becker, (763) (Typh.)
Kafero, E. D., 82 (Misc. Dis.)
Kagioka, T., Miki, T. & Yoshida, S., 885 (Hel.)

Kagiwada, R., with Fukuzumi & Obata, 34 (Typh.)
Kajahn, E., with Otten & Westphal, 190, 650 (Prot.)
Kakizaki, C., with Ouchi, (1061) (Hel.)
Kalisvaart, G., 306 (Der.)
Kall, E., 721, (721) (Oph.)
Kalra, S. L. & Jacob, V. P., 869 (R.F.)
—— & Rao, K. N. A., 868 (R.F.), 939, 940 (Typh.)
Kalyanum, T. S., with Inder Singh, 1096 (Mal.)
Kaneko, T., with Arakawa, Kittamura & Seki, 801 (Oph.)
Kano, R., (808) (Ent.)
——, with Sasa, (87) (Ent.)
—— & Sato, K., (92), (808) (Ent.)
——, —— & Tange, H., (92) (Ent.)
Kant, L., 266 (Chl.)
Kantemir, I., (512) (Am.)
Kao, C. M. & Chow, Y. L., 171 (Hel.)
Kao, L., with Maxwell, 963 (Lep.)
Kaplan, E., Zuelzer, W. W. & Neel, J. V., (439) (Haem.)
Kaplan, H., with Traub, Friedemann, Brasch & Huber, 507 (Rab.)
Kapur, P. N., with Pirzada, 440 (Haem.)
Kar, P. K., 235 (Mal.)
Kark, S. L. & Cassel, J., 914 (Reports, etc.)
Karandikar, V. S., with Viswanathan, Ramachandra Rao & Halgeri, 359 (Mal.)
Kariya, A., with Fukushima, Senda, Uenoyama, Inui, Ishigami, Naka, Iwasaki & Sakao, (439) (Haem.)
Karp, A. & Snyder, J. C., 763 (Typh.)
Kartman, L. & Repass, R. P., 1094 (Mal.)
Kåss, E., with Grassi, (1158) (Prot.)
—— & Steen, E., 727 *bis* (Prot.)
Kass, E. H., Geiman, Q. M. & Finland, M., 482 (Mal.)
Kato, G., with Kitaoka, Shishido, Katsura, Ito, Tatami, Matsuzawa & Machida, 257 (Typh.)
Kato, G., with Kitaoka, Shishido, Yoshida & Goto, 257 (Typh.)
Katsura, S., with Kitaoka, Shishido, Kato, Ito, Tatami, Matsuzawa & Machida, 257 (Typh.)
Kauffmann, F., 1114 (Chl.)
Kaufman, E. H., with Hunter, Ritchie, Pan, Yokogawa, Ishii, Szewczak, Weber, Asakura, Hishinuma & Williams, 633 (Hel.)
Kaufman, E. H., Jr., with Hunter & Pan, 879 (Hel.)
——, with Ritchie, Hunter, Pan, Nagano, Yokogawa, Szewczak, Hishinuma, Shimizu & Asakura, 881 (Hel.)
Kausche, G. A. & Sheris, E., 135 (Typh.)
Kawahata, A., (1074) (Heat Str.)
Kawahata, H., with Tokura, 374 (Mal.)
Kearns, C. W., with Sternburg, (562), 1163 (Ent.)
Keay, K. R., with Thomson, 532 (Def. Dis.)
Keenan, C. M., with Carpenter, (910) (Ent.)
Keidel, H. J. W., with Kraneveld & Houwink, 848 (Tryp.)
Keil, E., 631 (Lep.)
Keilbach, R., 807 (Ent.)
Keister, M. L., with Buck, 1162 (Ent.)
Keller, J. C., Davis, A. N. & Mooney, C. I., 235 (Mal.)
Kellersberger, E. R. & Rule, W., 410 (Lep.)
Kemp, H., with Romeiro & Barragat, 558 (Ent.)
——, with Szumlewicz, 1057 (Hel.)
Kermack, W. O., with Fraser, (115) (Mal.)
Kerr, K. B. & Cavett, J. W., 886 (Hel.)
Kerr, R. W., 564 (Ent.)
Kerrest, J., with Massal, 787 (Hel.)
Kershaw, W. E., 888 (Hel.)
Khalifa, A. A. & Salah, M. K., 1146 (Haem.)
Khan, J., with Kvittingen, Cutler, Guevara, McCullough, Rose, Ford, Tampi, Sen, Lakshwir & Dass, 967 (Lep.)
Khan, N., Suri, R. M. & Nair, P. M., 363 (Mal.)
Khanolkar, V. R., 56, 155 (1048) (Lep.)
—— & Rajalakshmi, K., 1048 (Lep.)
Kidder, G. W. & Dewey, V. C., 461 (B.R.)
Kikuth, W., (1096) (Mal.)
Kilgore, N. A., Jr., (398) (Am.)
Killough, J. H., (621) (Am.)
—— & Magill, G. B., 497 (Typh.)
——, —— & Smith, R. C., 696 (Am.)
Kilpatrick, J. W. & Fay, R. W., 941 (Typh.)
Kimura, J., 133 (Typh.)
Kimura, M., with Misao, Yamaoka, Yamada & Ishihara, 944 (Den.)
King, E. J., Bartholomew, R. J., Geiser, M., Ventura, S., Wooton, I. D. P., Macfarlane, R. G., Donaldson, R. & Sisson, R. B., 437 (Haem.)
Kinnear, A. A., with le Riche, Riordan, Smit, Ockerse, Best, Walker, du Toit, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Kirberger, E., 39 (Typh.)
Kirchberg, E., 85, (1163) (Ent.)
—— & Petri, K., 85 (Ent.)
Kirk, R., with Drysdale, 679 (Typh.)
——, with Lewis, D. J., 555 (Ent.)
Kirschbaum, M., with Romaña, 380 (Tryp.)
Kirwan, E. O'G., 774 (Lep.)
Kitamura, O. & Arakawa, S., 802 (Oph.)
Kitamura, O., with Arakawa, Seki & Kaneko, 801 (Oph.)
Kitaoka, M. & Inoue, H., 133 (Typh.)
——, Miura, T. & Ogata, T., 196 (Ent.)
——, Shishido, A., Kato, G., Katsura, S., Ito. T., Tatami, S., Matsuzawa, K. & Machida, I., 257 (Typh.)
——, ——, ——, Yoshida, S. & Goto, G., 257 (Typh.)
——, Takemori, N., Shishido, A. & Jo, K., 610 (Typh.)
Kitchen, D., with Rein, Marquez & Varela, 542 (Der.)
Kittrell, B. M., (553) (Misc. Dis.)
Kitzmiller, J. B., (1158) (Ent.)
Kjessler, A., with Mellgren & Alm, 1157 (Prot.)
Kleimans, M., with Joselevich & Zwaig, (1071) (Haem.)
Kleinschmidt, A. & Schleich, F., 124 (Tryp.)
Kley, D., with Ercoli, Gosford, Carminati & Schwartz, 249 (Tryp.)
Klimars, G., 639 (Hel.)
Klingberg, W. G., (67) (Hel.)
Kloos, K., with Diethelm & Heuck, 978 (Hel.)
Knight, K. L., with Hoogstraal, 40 (Y.F.)
——, with Mattingly, Rozeboom, Laven, Drummond, Christophers & Shute, 651 (Ent.)
Knipling, E. F., 556, 1159 (Ent.)
Knoblock, E. C., with Barnett, 654 (Ent.)
Knutson, H. & Szymkowicz, R. T., 857 (Pl.)
Knuttsgen, H., with Mohr, Berks & Ohr, 159 (Hel.)
Kobayashi, S., 1128 (Lep.)
Koch, M. L., with Garry, 448 (Misc. Dis.)
Kodlin, D., 681 (Typh.)

Koenigstein, R. P., 974 (Hel.)
—— & Chang, S. T., 409 (Lep.)
Koerber, R., 902 (Ulc.)
Kohls, G. M., with Philip, 498 (Typh.)
——, with Wharton, Jenkins, Brennan, Fuller & Philip, 93 (Ent.)
Kohn, M., with Sakon & Raphael, 548 (Oph.)
Kölling, H. L., 10 (Mal.)
Komiya, Y. & Kondo, S., 1058 (Hel.)
Komiya, Y. & Murase, K., 976 (Hel.)
Komiyama, S., with McMullen & Endo-Itabashi, 784 (Hel.)
Komiyama, S., with ——, ——, Seto & Stone, 785 (Hel.)
——, with ——, Ishii, Endo-Itabashi & Mitoma, 415 (Hel.)
——, with ——, ——, ——, Ozawa, Asakawa & Mitoma, 416 (Hel.)
Konar, N. R., with De, Sengupta & Bhattacharyya, 757 (Bl.)
—— & Sengupta, A. N., 691 (Chl.)
Konchady, D., with Kruse, 119 (Mal.)
Kondii, A., with Foy, 842 (Mal.), 1147 (Haem.)
——, with —— & Hargreaves, 892, 1146 (Haem.)
——, with ——, —— & Lowry, 1069 (Haem.)
Kondo, A., with Nakagami, Nakano, Yaoi & Otani, 387 (Rab.)
——, with Yaoi, Mikamo, Otani, Nakano & Nakagami, 388 (Rab.)
——, with Komiya, 1058 (Hel.)
Koprowski, H. & Cox, H. R., 615 (Rab.)
——, van der Scheer, J. & Black, J., 507 (Rab.)
Korns, R. F., with Berberian, Dennis & Angelo, 867 (Am.)
Korshunova, O. S. & Petrova-Piontkovskaya, S. P., 765 (Typh.)
Kothare, S. N., with de Sa, (636) (Hel.)
Kottegoda, S. R., with Cullumbine & Basnayake, 723 (Heat Str.)
Koulumies, R., with Telkkä & Wahlström, 527 (Hel.)
Kourí, J., with Kouri, 67 (Hel.)
Kourí, P. & Kourí, J., 67 (Hel.)
Kozar, Z., 293 (Hel.)
——, with Wysocka & Sikorska, (1156) (Prot.)
Kramer, S., with Binde, Preuss & Weyer, 497 (Typh.)
Kraneveld, F. C. & Djaenoedin, R., (492) (Tryp.)
Kraneveld, F. C., Houwink, A. L. & Keidel, H. J. W., 848 (Tryp.)
—— & Mansjoer, M., (492) *bis*, 493 *bis* (Tryp.)
Krisnan, K. V., with Ahuja, Pandit & Venkatraman, 394 (Chl.)
Krishnan, P., with Rao, 997 (Misc. Dis.)
Krüpe, M., 840 (Mal.)
Kruse, C. W. & Konchady, D., 119 (Mal.)
Kruszyński, J., 603 (Mal.)
Kryński, S., 763 (Typh.)
——, Kuchta, A. & Becla, E., 680, 763 (Typh.)
Kubo, S., with Akimoto & Hashimoto, (1061) (Hel.)
Kuchta, A., with Kryński & Becla, 680, 763 (Typh.)
Kühnelt, W., 84 (Ent.)
Kumm, H. W., 855 (Y.F.)
—— & Cerqueira, N. L., 42, 43 (Y.F.)
Kuntz, R. E., 1052, 1134 (Hel.)
——, with Stirewalt & Evans, 64 (Hel.)
—— & Wells, W. H., 973 (Hel.)
Kuwata, T., 611 (Typh.)
Kvittingen, J., 967 (Lep.)
——, Cutler, J. C., Guevara, J. A., McCullough, J. C., Rose, E., Ford, V., Tampi, R. B., Sen, S., Lakshwir, Khan, J. & Dass, P., 967 (Lep.)
Kyobe, J., with Homes & Gee, 174 (Haem.)
——, with ——, Stanier, Semambo, Jones & Gee, 535 (Def. Dis.)

L

Laarman, J. J., 953 (Am.)
Lacaz, C. da S., 444 (Der.)
Lachmajerowa, J., 108 (Mal.)
—— [Lachmajer, J.], 838 (Mal.)
Lackman, D. B., with Ormsbee & Pickens, 259 (Typh.)
Ladell, W. S. S., 314, 1073 (Heat Str.)
de Laey, A. & Dubois, J., 774 (Lep.)
La Face, L., 1004 (Ent.)
Lagarde, J., with Giroud, Le Gac, Rouby & Gaillard, 256 (Typh.)
——, with Le Gac, Giroud & Rouby, (386) (Typh.)
Lagrange, E., 415 (Hel.)
—— & Fain, A., 781 (Hel.)
—— with ——, 783 (Hel.)
—— & Scheecqmans, G., 524 (Hel.)
Lahiri, M. N., with Sodeman & Panja, 1155 (Ulc.)
Lahiri, S. C., 690 (Chl.)
Laier, R., with Bingel & Mannhardt, 1109 (Typh.)
Laird, R. L., with McVay & Stern, 695 (Am.)
——, with Porter & Dusseau, 1102 (Mal.)
de Lajudie, P., Porte, L. & Brygoo, E. R., 724 (Misc. Dis.)
Lakshwir, with Kvittingen, Cutler, Guevara, McCullough, Rose, Ford, Tampi, Sen, Khan & Daas, 967 (Lep.)
Lal, B. N. & Srivastava, S. B., 88 (Ent.)
Lal, S. B., 440 (Ep. Dropsy)
Lalanne, A., with Mornet & Cissoko, (492), (607) (Tryp.)
Lalu, P., with Gaud, Maurice & Faure, 729 (Ent.)
Lambault, E., with Lamy, 953 (Am.)
Lambrecht, F. L., 1094 (Mal.)
Lampe, P. H. J., 68 (Hel.), 964 (Lep.)
Lamy, H., with Lamy, 622 (Am.)
Lamy, L., 145 (Am.)
——, with Deschiens, 237 (Mal.)
—— & Lambault, E., 953 (Am.)
—— & Lamy, H., 622 (Am.)
Lanard, F. W., with Shrum & Wilkerson, 927 (Mal.)
Landau, A., 84 (Prot.)
Landauer, E., with Liu, 939 (Typh.)
Landquist, J. K., with Jones & Senior, 1119 (Am.)
Landtman, B., 985 (Hel.)
Lane, R., 149 (Am.)
Lapage, G., 456 (B.R.)
Lapi, A., Davis, C. L. & Anderson, W. A., 945 (Rab.)
Laranja, F. S., (382) (Tryp.)
Lari, F. A., (807) (Ent.)
Larmande, A., with Moline, Toulant & Toulant, 720 (Oph.)
——, with Toulant & Toulant, 80, 187, 545 (Oph.)
Larsh, J. E., Jr., with Mackie & Mackie, 413 (Hel.)
Larson, A., with Gunnison & Lazarus, 45 (Pl.)

Larson, C. L., Philip, C. B., Wicht, W. C. & Hughes, L. E., 265 (Pl.)
Lasbrey, A. H., 648 (Ulc.)
Lass, R., 612 (Typh.)
Laszlo, H. P., (760) (Tryp.)
Launoy, L., 491 (Tryp.)
Laurent, C., with Giroud, Le Gac & Brizard, 1106 (Typh.)
Laven, H., 1078 (Ent.)
——, with Mattingly, Rozeboom, Knight, Drummond, Christophers & Shute, 651 (Ent.)
Lavier, G. & Schneider, J., 115 (Mal.)
Lavín, F., with Basnuevo, Borbolla, Rodríguez Salinas, Costales & Cepero, 639 (Hel.)
Lavoipierre, M., (556) (Ent.)
Lawas, I., with Stransky & Dauis-Lawas, 75 (Def. Dis.)
Lawless, D. K., with Sapero & Strome, 727 (Prot.)
Lawson, J. W. H., (451) (Ent.)
Lazarus, A. S., with Gunnison & Larson, 45 (Pl.)
Lea, A. O., with DeLong & Boush, 1003 (Ent.)
Lebied, B., 789 (Hel.)
Lecomte, O., with Blass & Macheboeuf, (618) (Chl.)
Lecuiller, A., with Floch, 158, 874 (Lep.), (790) (Def. Dis.)
——, with —— & Destombes, 277, 278 *bis*, 279 (Lep.)
——, with —— & Sureau, 1129 (Lep.)
Ledowsky, V., with Wade, 963 (Lep.)
Lee, D. J., 661 (Mal.)
Lee, P., with Maryon & Shute, 477 (Mal.)
Lee, T. M. & Ling, C. C., 29 (Leish.)
Leeson, H. S., 1047 (R.F.)
Lefranc, M., (609) (Leish.)
Le Gac, P., 245 (Tryp.)
——, Giroud, P. & Baup, G., 498 (Typh.)
——, with Giroud, Ganzin & Gaillard, 1036 (Typh.)
——, Giroud, P., le Henaff, A. & Baup, G., 682 (Typh.)
——, with Giroud, Rouby, Lagarde & Gaillard, 256 (Typh.)
—— & Giroud, P., 35 (Typh.)
——, with Giroud, Brizard & Laurent, 1106 (Typh.)
——, Giroud, P., Chamard, R. & Reizes, C., 36 (Typh.)
——, ——, Rouby, M. & Lagarde, J., (386) (Typh.)
——, with Heim de Balsac & Giroud, 255 (Typh.)
——, Rouby, M. & Dieng, C., (1110) (Y.F.)
Legoff, I., with Ruiz Sanchez, Paredes & Riebeling, 12 (Mal.)
Le Henaff, A., with Le Gac, Giroud & Baup, 682 (Typh.)
Lehmann, H., 565 (Reports, etc.), 795 (Haem.)
—— & Cutbush, M., 1152 (Haem.)
Leigh, D., 533 (Def. Dis.)
Leitch, J. G., with Foster & Redstone, 414 (Hel.)
Leite, A. S. & Ré, L., (996) (Der.)
Leite, G., with Pellegrino, Borrotchin & Brener, 678 (Tryp.)
Leleup, N., 1029 (Tryp.)
Lelong, M. & Desmonts, G., 905 (Prot.)
Lembach, J. V., with Granett & Connola, 94 (Ent.)
Lenczner, M. & Dubash, J., (957), 1045 (Am.)
Lennette, E. H., Clark, W. H., Abinanti, M. M., Brunetti, O. & Covert, J. M., 766 (Typh.)
Lennette, E. H., with Clark, Bogucki, Dean & Walker, 38 (Typh.)
——, Clark, W. H. & Jensen, F. W., 500 (Typh.)
——, ——, —— & Toomb, C. J., 1039 (Typh.)
——, with Clark, Railsback & Romer, 136 (Typh.)
——, with —— & Romer, 38, 258 (Typh.)
——, with ——, ——, Holmes, Welsh & Abinanti, 38 (Typh.)
——, Dean, B. H., Abinanti, F. R., Clark, W. H., Winn, J. F. & Holmes, M. A., 39 (Typh.)
——, Holmes, M. A. & Abinanti, F. R., 767 (Typh.)
——, with Meiklejohn & England, 688 *bis* (Den.)
—— & Welsh, H. H., 38 (Typh.)
——, with Welsh, Abinanti & Winn, 386 (Typh.)
Lépine, P. & Atanasiu, P., 615 (Rab.)
——, with Pavilanis & Morisset, 766 (Typh.)
Leprosy Review, 155, 628 (Lep.)
Lescommères, J., with Faure, (695) (Am.)
Lesser, M. A., (810) (Ent.)
Levaditi, C. & Vaisman, A., 1101 (Mal.)
——, —— & Henry-Eveno, J., (856) *bis* (Rab.)
Leiv, A. A., with Carrington, Crowther, Davey & Rose, 362 (Mal.)
Levi-Castillo, R., (1003) (Ent.)
Lewis, D. J., 376 (Tryp.)
——, with Kirk, 555 (Ent.)
Lewis, G., with Senior-White, (451) (Ent.)
Lewthwaite, R., with Bailey, Ley, Diercks & Smadel, 34 (Typh.)
Ley, A. C., with Wisseman, Jackson, Hahn & Smadel, 134 (Typh.)
Ley, H. L., Sayer, W. J., Hobson, A. C. S., Vanreenen, R. M., Tipton, V. J., Frick, L. P., Ballard, E. L. & Traub, R., 274 (Am.)
——, Jr., with Bailey, Diercks, Lewthwaite & Smadel, 34 (Typh.)
——, Jr., with Smadel, Diercks, Paterson, Wisseman & Traub, 682 (Typh.)
Li, F., (707) (Hel.)
——, with Hoeppli, 700 (Hel.)
Li, H. H. & Feng, L. C., 324 (Ent.)
Li, S. Y., with Hsü, Wang, Fan & Huang, 878 (Hel.)
Liang, K. C., with Watson, 223 (Mal.)
Lie-Kian-Joe, 65 (Hel.)
——, with Bras, (427) (Hel.)
Liétar, J., with Vincent, 378 (Tryp.)
Lima, A. B., with de Freitas, Neto, Nesti & de Andrade e Silva, (759) (Tryp.)
Lima, F. de O., with Corréa, (9) (Mal.)
Lima, H. da R., 131 (Typh.)
Lima, M. M., with Ferreira & Rachou, 18 (Mal.)
Lin, S., with Hunter, Ritchie & Pan, 1050 (Hel.)
Lincicome, D. R., with Senoo, 426, 427 (Hel.)
Linder, L. A., with von Zeipel, 1157 (Prot.)
Lindquist, A. W., (910) (Ent.)
——, with Hoffman, 910 (Ent.)
——, with —— & Butts, 88 (Ent.)
——, with —— & Roth, 452 (Ent.)
——, with ——, —— & Butts, (808) (Ent.)
——, Roth, A. R., Hoffman, R. A. & Butts, J. S., 561 (Ent.)
——, with Yates & Butts, (1083) (Ent.)
Lindquist, W. D., 528 (Hel.)
Lindsay, A. E., Gossard, W. H. & Chapman, J. S., 620 (Am.)
Lineweaver, H. O., with Reagan, Schenck & Brueckner, 137 (Rab.)
Ling, C. C., with Lee, 29 (Leish.)

Linhard, J.. with Pales, 304 (Haem.)
Link, V. B., 389 (Pl.)
Lipparoni, E., 541 (Der.), 843 (Mal.)
Lippi, M., 1052 (Hel.)
Little, P. A. & Oleson, J. J., 493 (Tryp.)
Liu, W & Landauer, E., 939 (Typh.)
Ljupša, F., with Murray, Djaković & Snyder, 37 (Typh.)
——, with ——, Pšorn, Djaković, Sielski, Broz, Gaon, Pavlević & Snyder, 383 (Typh.)
Liu, W., with Ch'in & Liu, 853 (Typh.)
Liu, Y., with Ch'in & Liu, 853 (Typh.)
Lobo, M. B., with de Góes, 607 (Tryp.)
Lockhart, J. A., with Miller, (200) (Ent.)
Lodens, J. G., with van Goor, 930 (Mal.)
Loehning, R. W. & van Baaren, H. J., 910 (Lab.)
Löffler, W. & Mooser, H., (762) (Typh.)
Loo, T. L., with Schmidt, Fradkin & Hughes, 1025 (Mal.)
Loomis, G. W., with Hall, 838 (Mal.)
Loomis, L. N., with Herdt & Nolan, 159 (Hel.)
Lopes, A., 499 (Typh.)
López Fernández, F., Pérez Sorá, E. & Arocha Machado, A., 689 (Rab.)
López-Neyra, C. R. & Balcázar Rubio, M., 428 (Hel.)
Lo Siauw Goen, 946 (Rab.)
Lotte, 246 (Tryp.)
Lotte, A. J., (1033) (Tryp.)
Loughlin, E. H. & Joseph, A. A., 53 (Ys.)
——, Rappaport, I., Joseph, A. A. & Mullin, W. G., 424 (Hel.)
——, ——, Mullin, W. G., Wells, Helen S., Joseph, A. A. & Shookhoff, H. B., 712 (Hel.)
——, Rice, J. B., Wells, H. S., Rappaport, I. & Joseph, A. A., with Rene, H., 751 (Mal.)
——, with Wells, Shookhoff, Mullin, Sterman & Rappaport, 639 (Hel.)
Louis, L. A., 296 *bis* (Def. Dis.)
Lourie, E. M., 774 (Lep.)
——, with Guimaraes, 126 (Tryp.)
——, Morley, J. S., Simpson, J. C. E. & Walker, J. M., 250 (Tryp.)
—— & Walker, J. M., 250 (Tryp.)
Lowe, J., 629, 632, (871) (Lep.)
Lowry, J., with Foy, Kondi & Hargreaves, 1069 (Haem.)
Lubinsky, G., 859 (Am.)
de Lucena, D. T. & Costa, J. L., 7 (Mal.)
Lück, G., with Herzberg, Urbach & Hartmann-Heyn, 40, 500 (Typh.)
Lüdicke, M. & Piekarski, G., 839 (Mal.)
Lugo, A., with Divo & Goldman, 508 (Rab.)
Lumbroso, P., with Siguier, Feld, Piette & Welti, 882 (Hel.)
Lumsden, W. H. R., 41, 502 (Y.F.)
——, with Haddow, Dick & Smithburn, 260 (Y.F.)
——, with ——, van Someren, Harper & Gillett, 85 (Ent.)
Lund, E., 862 (Am.)
Luongo, M. A., Reid, D. H. & Weiss, W. W., 432 (Hel.)
Luoto, L., Winn, J. F. & Huebner, R. J., 767 (Typh.)
Luttermoser, G. W., Haskins, W. T., Coleman, N. & Jumper, J. R., 697 (Am.)
Lwoff, A., 459 (B.R.)
Lwoff, M., 460 (B.R.)
Lymburner, R., with Goldberg, 284 (Hel.)
Lyons, F. M., 547 (Oph.)
Lysenko, M. G., (492) (Tryp.)

M

McArthur, J., 227 (Mal.)
MacArthur, W. P., 356 (Mal.), 388, 1111 (Pl.)
Mac Callan, A. F., (312) (Oph.)
McCarey, A. G., 622 (Am.)
McCarty, W. R., with Sherry & Tillett, 399 (Am.)
McConnachie, E. W., with Bishop, 673 *bis* (Mal.)
McCullough, J. C., with Kvittingen, Cutler, Guevara, Rose, Ford, Tampi, Sen, Lakshwir, Khan & Dass, 967 (Lep.)
McDearman, S. C. & Dunham, W. B., 954 (Am.)
Macdonald, E. M. & Scott, J. A., 1037 (Typh.)
——, with Scott & Terman, 789 (Hel.)
Macdonald, G., 354, 569, 813 (Mal.), 1006 (Ent.)
Macdonald, O. J. S. & Rao, P. V., 10 (Mal.)
McDonald, R. K., with Miller, 375 (Bl.)
——, Miller, J. H. & Roach, E. B., 375 (Bl.)
de Macedo, J. J., with Piza, Monteiro, Brandão & Neto, (257) (Typh.)
McFadzean, J. A., 886 (Hel.)
Macfarlane, R. G., with King, Bartholomew, Geiser, Ventura, Wootton, Donaldson & Sisson, 437 (Haem.)
McGeachin, R. L., with Cantrell, 492 (Tryp.)
McGiff, J., with Blumberg & Guicherit, 838 (Mal.), 979 (Hel.)
McGregor, I. A. & Smith, D. A., 663 (Mal.)
MacGregor, R. G. S., with Carlile & Duff, 1068 (Def. Dis.)
Machado, H., (937) (Tryp.)
Machado, W. G. & Martins, C., 63 (Hel.)
Macheboeuf, M., with Blass & Lecomte, (618) (Chl.)
Machida, I., with Kitaoka, Shisido Kato, Katsura, Ito, Tatami & Matsuzawa, 257 (Typh.)
McIntosh, A. H., (95), (454) (Ent.)
Mackay, D. H., 658 (Reports, etc.)
Mackay, I. A., (810) (Ent.)
Mackay-Dick, J., with Munro-Faure, Andrew & Missen, 256 (Typh.)
McKee, R. W., 461 (B.R.)
McKeown, K. C., 441 (Vms.)
Mackerras, I. M., Ratcliffe, F. N., Gilmour, D. & Mules, M. W., 119 (Mal.)
Mackie, A. & Raeburn, J., (700), 882 *bis* (Hel.)
Mackie, J. W., with Mackie & Larsh, 413, (Hel.)
Mackie, T. T., Larsh, J. E., Jr. & Mackie, J. W., 413 (Hel.)
Mackinnon, J. E., 994 *bis* (Der.)
McLendon, S. B., with Ramakrishnan, Young, Jeffery & Burgess, 924 (Mal.)
McLeod, C. P. & Magnuson, H. J., 516 (Ys.)
McLeod, J. A., with Wardle, 1011 (B.R.)
McLetchie, J. L., 243 (Tryp.)
McMahon, J., 984 (Hel.)
McMahon, J. P., 73 (Hel.)
McMullen, D. B., Endo-Itabashi, T., Seto, S., Komiyama, S. & Stone, P. R., 785 (Hel.)
——, Komiyama, S. & Endo-Itabashi, T., 784 (Hel.)
——, ——, Ishii, N., Endo-Itabashi, T. & Mitoma, Y., 415 (Hel.)
——, ——, ——, ——, Ozawa, K., Asakawa, T. & Mitoma, Y., 416 (Hel.)

Macpherson, K., 464 (B.R.)
McQuay, R. M., Jr., 701 (Hel.)
McQueen, E. G., 435 (Def. Dis.)
McRary, W. L., Noble, E. R. & Tondevold, E. L., 937 (Tryp.)
McTavish, W. B., with Savage, 487 (Mal.)
McVay, L. V., Jr., Evans, L. & Sprunt, D. H., 401 (Am.)
——, Jr. & Carroll, D. S., 799 (Der.)
——, Jr., Laird, R. L. & Stern, T. N., 695 (Am.)
——, Jr. & Sprunt, D. H., 865 (Am.)
Maddock, R. K., 518 (Lep.)
Madras, 96 (Reports, etc.)
Maduro, F., with Basnuevo, Cowley, Blanco Rabassa & Achkar, 638 (Hel.)
Maegraith, B., 847 (Bl.)
——, Jones, E. S. & Andrews, W. H. H., 111 (Mal.)
Maegraith, B. G., 354 (Mal.)
——, with Andrews, 662 (Mal.)
——, with Jones & Sculthorpe, 756, 757 (Mal.)
Maes, H., 1163 (Ent.)
Magath, T. B. & Thompson, J. H., Jr., 790 (Hel.)
Magid, A., with Girgis, 635 (Hel.)
Magill, G. B., with Killough, 497 (Typh.)
——, with —— & Smith, 696 (Am.)
de Magistris, L., 163 (Hel.)
Magnuson, H. J., with McLeod, 516 (Ys.)
Magnusson, J. H., with Gard, 805 (Prot.)
Maillot, L., 489 (Tryp.)
Mainzer, F., 280 (Hel.)
Maitre, P., with Molinier & Péronnet, (793) (Sp.)
Maki, T. & Hirakawa, Y., (1061) (Hel.)
Makstenieks, O., with Verlinde, 193 (Prot.)
Malard, A., 852 (Leish.)
Malaya, Federation of, 97 (Reports, etc.), 750 (Mal.)
——, Malaria Advisory Board, 1098 (Mal.)
Malcolm, S., (1068) (Def. Dis.)
Malfatti, M. G., (872) (Lep.)
——, & Jonquieres, E. D. L., 775 (Lep.)
Mallis, A., with Miller & Sharpless, 808 (Ent.)
Mamola, P., with Siggia, (901) (Oph.)
Manceau, J. N., with da Costa, Maroja & de Andrade, 706 (Hel.)
Mandic, L. & Stankovic, I., 308 (Oph.)
Mandoul, R. & Jacquemin, P., 233 (Mal.)
Mannhardt, S., with Bingel & Laier, 1109 (Typh.)
Mansjoer, M., with Kranveld, (492) *bis*, 493 *bis* (Tryp.)
Manson-Bahr, P. H., 353 (Mal.), 788 (Hel.), 1088 (B.R.)
Manson-Bahr, P. & Muggleton, W. J., 1061 (Hel.)
Manson-Bahr, P. E. C., 166 (Hel.)
Mansour, R., with Henry, Watson & Zaki, 851 (Leish.)
Mansour, T. E., 283 (Hel.)
Mantel, N., with Tobie, Reardon, Bozicevich, Shih & Thomas, 267 (Am.)
Manwell, R. D. & Drobeck, H. P., 725 (Prot.)
Mara, M., 837 (Mal.)
di Marco, I. & d'Agata, A., 258 (Typh.)
Marcolongo, R., with Romaña & Toranzos, 426 (Hel.)
Mariani, G., 321 (Prot.)
Mariana, M., with d'Alessandro & Gagliani, 1004 (Ent.)
Marienberg, G., 26 (Tryp.)
Marie-Suzanne, Sohier, R. & Noël, R., 55 (Lep.)
Marie-Suzanne (Soeur), Noël, R. & Sohier, R., 522 (Lep.)
Markos, B. G., 16 (Mal.)
Marks, E. N., 168 (Hel.)
Marmion, B. P., with Harvey & Forbes, 385 (Typh.)
——, with Stoker, 683 (Typh.)
Maroc Méd., 1116 (Am.)
Maroger, F., with Martin, (498) (Typh.)
Maroja, R., with da Costa, Manceau & de Andrade, 706 (Hel.)
Marques, A. R., with Passos, Baptista, Martins, Sampaio & Silveira, 1126 (Lep.)
Marquez, F., with Rein, Kitchen & Varela, 542 (Der.)
Marques, R. J., 973 (Hel.)
Márquez, V., with Curbelo & Veciana, 33 (Typh.)
Marqvard, H., 442 (Vms.)
Martin, M., with Blanc, (509) (Pl.), 863 (Am.)
Martin, R. & Maroger, F., (498) (Typh.)
Martin, W. E., with Simmonds & Wagner, 65 (Hel.)
Martín Sanz, L., (616) (Pl.)
Martini, E., 750 (Mal.)
Martins, A. B. C. N., with Passos, Baptista, Sampaio, Silveira & Marques, 1126 (Lep.)
Martins, C., with Machado, 63 (Hel.)
Maruyama, M., with Akimoto, Fukushima, Yasuda & Tsuruta, (1061) (Hel.)
Maryon, M., Lee, P. & Shute, P. G., 477 (Mal.)
——, with Shute, 358, 1095 (Mal.)
Masiluñgan, V. A., with Pesigan, 282 (Hel.)
Massal, E. & Kerrest, J., 787 (Hel.)
Massonnat, J., with Portier & Boulard, (609) (Leish.)
——, with —— & Messerschmitt, (641) (Haem.)
Mastrandrea, G., 1066 (Hel.)
Masturzo, M., 1107 (Typh.)
Masuda, K. & Aoyama, J., 715 (Def. Dis.)
Matheson, K., Thjøtta, T. & Steen, E., 805 (Prot.)
Mathur, K. S., 1149 (Haem.)
Matsusaki, G., 423 (Hel.)
Matsuzawa, K., with Kitaoka, Shishido, Kato, Katsura, Ito, Tatami & Machida, 257 (Typh.)
Mattingly, P. F., Rozeboom, L. E., Knight, K. L., Laven, H., Drummond, F. H., Christophers, S. R. & Shute, P. G., 651 (Ent.)
Mattman, P. E., with Schnitker & Bliss, 173 (Def. Dis.)
Mau, E. S. C., with Bonnet & Gross, 510 (Pl.)
Mauri, A. C., Hadler, W. A. & Carvalho, C. M., 412 (Lep.)
Maurice, A., with Gaud, Faure & Lalu, 729 (Ent.)
Mauritius, Colony of, 366 (Mal.)
Maxwell, J. L. & Kao, L., 963 (Lep.)
May, M. C., with Schubert, 1045 (Am.)
Mazzotti, L., 74, 427 (Hel.), (200) (Ent.)
Medical Research Council, 1145 (Haem.)
Medina, J. A., with Roche, Convit & Blomenfeld, 58 (Lep.)
Meerovitch, E., with Adler & Yoeli, 698 (R.F.)
Mehlman, B. & von Brand, T., (876) (Hel.)
——, with ——, Weinstein & Weinbach, 1067 (Hel.)
Mahta, J. N., 210 (B.R.)
Meiklejohn, G., England, B. & Lennette, E. H., 688 *bis* (Den.)
de Meillon, B., 105, 109 (Mal.)
Meira, J. A., 737 (B.R.)
—— & Corrêa, M. O. A., 401 (Am.)

de Mel, B. V., with Jayasekera & Cullumbine, 436 (Def. Dis.)
Meleney, H. E., with Moore, 877, 1057 (Hel.)
——, Moore, D. V., Most, H. & Carney, B. H., 880 (Hel.)
Mellgren, J., Alm, L. & Kjessler, A., 1157 (Prot.)
de Mello, J. P., 591 (Mal.)
de Mello, R. F., with Amorim & Saliba, 1071 (Vms.)
Melsom, R., 516 (Lep.)
Mendheim, H., with Bergstermann & Scheid, 568 (B.R.)
——, Scheid, G. & Schmidt, J., 707 (Hel.)
Mendiola, R. & Cortés Ochoa, R., 183 (Der.)
Mendonça, W., with Pedreira de Freitas, 27 (Tryp.)
Mendoza, J. B., 843, (927) (Mal.)
Menon, P. S., with Gopalan, Venkatachalam & Rao, 987 (Def. Dis.)
Mercado, T. I. & Coatney, G. R., 670, 844 (Mal.)
Mercier, S., 752 (Mal.), 1042, 1044 (Pl.)
Merland, R. & Cresté, M., 363 (Mal.)
Merle, F., 598 (Mal.)
Messent, J. J., 62 (Hel.)
Messerschmitt, J., with Portier & Massonnat, (641) (Haem.)
Messinezy, D. A., 565 (Reports, etc.)
van Meurs, J. H., 58 (Lep.)
Mexico, D. F. Secretaria de Salubridad y Asistencia, 754 (Mal.)
Meyer, A., with Guillaume, (807) (Ent.)
Meyer, E., with Baker, Sommer, Foster & Meyer, 616 (Pl.)
Meyer, K. F., with ——, ——, —— & ——, 616 (Pl.)
——, with Chen & Quan, 617 (Pl.)
——, with Silverman, Elberg & Foster, 1043 (Pl.)
Meyer, L. M., with Cohen & Fadem, 992 (Sp.)
——, with Diéz Rivas & Hernández Morales, 793 (Sp.)
de Michele, D., with Gambardella, (511) (Am.)
Micks, D. W., 1073 (Vms.)
—— & Ellis, J. P., 451, 807 (Ent.)
Mikamo, Y., with Yaoi, Otani, Nakano, Kondo & Nakagami, 388 (Rab.)
Miki, T., with Kagioka & Yoshida, 885 (Hel.)
Miller, A. C., Mallis, A. & Sharpless, R. V., 808 (Ent.)
Miller, B., with Nushan, (1123) (Am.)
Miller, J. H. & McDonald, R. K., 375 (Bl.)
——, with McDonald & Roach, 375 (Bl.)
Miller, M. J. & Lockhart, J. A., (200) (Ent.)
—— & Munroe, E., 525 (Hel.)
Milletari, A., 104 (Mal.)
Miltzow, G., 1076 (Prot.)
Minck, A., with Minck, 142 (Chl.)
Minck, R. & Minck, A., 142 (Chl.)
Ministry of Agriculture and Fisheries, (67) (Hel.)
Miranda, J. R., (937) (Tryp.)
Misao, T., Yamaoka, K., Yamada, Y., Ishihara, K. & Kimura, M., 944 (Den.)
Misra, B. G., with Raghavan & Roy, 1140 (Hel.)
Misra, S. S., 723 (Misc. Dis.)
Missen, G. A. K., with Munro-Faure, Andrew & Mackay-Dick, 256 (Typh.)
Missiroli, A., 89 (Ent.)
Mitchell, W. A., with Holway & Salah, 729 (Ent.)
Mitlin, N., with Gersdorff & Nelson, 563 (Ent.)
——, Nelson, R. H. & Gersdorff, W. A., 453 (Ent.)
Mitoma, Y., with McMullen, Komiyama, Ishii & Endo-Itabashi, 415, (Hel.)
——, with ——, ——, ——, ——, Ozawa & Asakawa, 416 (Hel.)
Mitra, R. D. & Roy, D. N., (1083) *bis* (Ent.)
Mitsui, Y. & Tanaka, C., 187 (Oph.)
——, ——, Iwashige, Y. & Yamashita, K., 307 (Oph.)
Miura, T., with Kitaoka & Ogata, 196 (Ent.)
Miyagawa, F., with Harada, Sukegawa, Tuboi & Nozawa, 139 (Pl.)
Miyake, H., Oike, K., Amoo, K. & Fujimoto, H., (804) (Misc. Dis.)
Miyazaki, I., 884 (Hel.), (1002) (Ent.)
Mofidi, C., with Baltazard, Bahmanyar & Pournaki, 957 (R.F.)
——, with ——, —— & Seydian, 1041 (Pl.)
Mohammed, A. H., 540 (Vms.)
Mohiuddin, A., (1104) (Leish.)
Mohi-Ud-Din, A. & Rahim, A., 477 (Mal.)
Mohr, W., 842 (Mal.)
——, Berka, W., Knüttgen, H. & Ohr, A., 159 (Hel.)
Moignoux, J. B., (776), (789) (Hel.)
Moise, R., 837 (Mal.)
Mole, R. H., (1074) (Heat Str.)
——, with Horne, 82 (Heat Str.)
Moline, D., Toulant, P., Larmande, A. & Toulant, M., 720 (Oph.)
Molinier, A., Péronnet, M. & Maitre, P., (793) (Sp.)
Møller-Christensen, V. & Faber, B., 872 (Lep.)
Mollinedo, R., with Bolgert & Montel, 279 (Lep.)
Moncrief, I. H., with Dickman, 77 (Haem.)
de Mondolfo, A. A., with Romaña, 381 (Tryp.)
Monnet, A. & Baylet, R., 248, 604, 605, (605) (Tryp.)
——, —— & Reynaud, R., 1030 (Tryp.)
Montauffier, R. E., with André & Beauchesne, (1037) (Typh.)
Monteiro, E. L., de Almeida, F. & Moura, R. de A., 185 (Der.)
——, with —— & ——, (184) (Der.)
——, with Piza, de Macedo, Brandão & Neto, (257) (Typh.)
Montel, L. R., 152 (Ys.)
——, with Bolgert & Mollinedo, 279 (Lep.)
Montestruc, E., 678 (Tryp.)
—— & Blache, R., 518, 1131 (Lep.)
——, with Fouche, (30) (Leish.)
—— & Saint-Cyr, C., 903 (Ulc.)
——, —— & Vertueux, G., 314 (Ulc.)
Montézin, G., with Schneider, 274 (Am.)
——, with —— & Biheu, 666 (Mal.)
Mookerjee, G. C. & Ghose, B. K., (992) (Haem.)
Mooney, C. I., with Keller & Davis, 235 (Mal.)
Mooney, F. S., 1070 (Haem.)
Moore, A. M., with Taylor & Schwarz, 296 (Hel.)
Moore, D. V. & Meleney, H. E., 877, 1057 (Hel.)
——, with ——, Most & Carney, 880 (Hel.)
Moore, S., Toczydlowski, A. H. & Sweetman, H. L., 199 (Ent.)
Mooser, H., (1106) (Typh.)
——, with Löffler, (762) (Typh.)
Morault, with Desvignes, 312 (Oph.)
Morcos, F., with Nor Eldin, 927 (Mal.)
Moreira, L. F., with Torres, Duarte & Guimarães, 720 (Der.)

Moreno, J., with Droguett del Fierro, Raffo & Cabezas, 78 (Vms.)
Morgan, B. B., with Dicke, 556 (Ent.)
Morgan, C., with Hottle, Peers & Wyckoff, 264 (Rab.)
Morgenthau, J. E., with Smith, (305) (Haem.)
Morisset, N., with Pavilanis & Lepine, 766 (Typh.)
Moriya, S., with Tanaka & Ikuzawa, (857) (Pl.)
——, with ——, —— & Sumiyoshi, (857) (Pl.)
Morlan, H. B. & Hines, V. D., 34 (Typh.)
Morley, J. S., with Lourie, Simpson & Walker, 250 (Tryp.)
Mornet, P., Lalanne, A. & Cissoko, M., (492), (607) (Tryp.)
Morris, K. R. S., 21, 1102 (Tryp.)
Morris, P., with Frumin & Waldman, 1071 (Haem.)
Morris, R. M., 208 (Reports, etc.)
Morton, T. C., Stamm, W. P. & Seidelin, R., 1117 (Am.)
Moscovici, C., with Babudieri, 612 (Typh.)
Mosna, E., 90 (Ent.)
Mossop, M. C., 676 (Tryp.)
Most, H., 331 (B.R.)
——, with Davis, 986 (Hel.)
——, with Meleney, Moore & Carney, 880 (Hel.)
Mounter, L. A., 305 (Vms.)
Moura, R. de A., with de Almeida & Monteiro, (184) (Der.)
——, with Monteiro & de Almeida, 185 (Der.)
de Moura, S., with Moutinho & Grillo, 548 (Oph.)
de Moura, S. A. L., (524) (Hel.)
—— & Remião, M. S., (509) (Pl.)
Moustardier, G., (1156) (Ulc.)
Moutinho, H., Grillo, E. M. & de Moura, S., 548 (Oph.)
Moyle, V. & Baldwin, E., (977) (Hel.)
Mudrow-Reichenow, L., (1093) (Mal.)
Muggleton, W. J., with Manson-Bahr, 1061 (Hel.)
Mühlpfordt, H., 322 (Prot.)
Muir, E., 774 (Lep.)
——, with Rogers, 339 (B.R.)
Muirhead-Thomson, R. C., 336 (B.R.)
——, Gordon, R. M. & Davey, T. H., 1006 (Ent.)
Mukerjee, N., with Dharmendra & Chatterjee, 520 (Lep.)
Mukerji, A., 517 (Lep.)
Mules, M. W., with Mackerras, Ratcliffe & Gilmour, 119 (Mal.)
Mullet, S., with Coutelen, Gervois, Cochet & Biguet, 970 (Hel.)
Mullin, W. G., with Loughlin, Rappaport & Joseph, 424 (Hel.)
——, with ——, ——, Wells, Joseph & Shookhoff, 712 (Hel.)
——, with Wells, Shookhoff, Sterman, Loughlin & Rappaport, 639 (Hel.)
Mundel, G., with Dreyfuss & Benyesch, 305 (Haem.)
Mungavin, J. M., (1129) (Lep.)
Muniz, J., Soares, R. & Batista, S., 604, (Mal.)
Munk, J., with Glücker, 1039 (Typh.)
Munro, D. S., with Wilson & Richard, 599 (Mal.)
Munroe, E., with Miller, 525 (Hel.)
Munro-Faure, A. D., Andrew, R., Missen, G. A. K. & Mackay-Dick, J., 256 (Typh.)
Murakuni, R., with Hunter, Ritchie, Nagano, Ishii, Pan, Weber, Szewczak & Asakura. 523 (Hel.)
Murase, K., with Komiya, 976 (Hel.)
Muraz, 411 (Lep.)
Murgatroyd, F., (842) (Mal.)
Murphy, W. F. & Flannery, J. L., (1157) (Prot.)
Murray, C. C., with Hill, Rhode & Escoffery, 515 (Ys.)
Murray, E. S., Cohen, S., Jampol, J., Ofstrock, A. & Snyder, J. C., 681 (Typh.)
——, Djaković, P., Ljupša, F. & Snyder, J. C., 37 (Typh.)
——, with Fuller, Ayres, Snyder & Potash, 35 (Typh.)
——, Ofstrock, A. & Snyder, J. C., 610 (Typh.)
——, Pšorn, T., Djaković, P., Sielski, S., Broz, V., Ljupša, F., Gaon, J., Pavlević, R., & Snyder, J. C., 383 (Typh.)
Murray, N. A., with Faust, Agosín, Garcia-Laverde, Sayad & Johnson, 980 (Hel.)
Murray, N. L., with Amies, Scott & Warren, 897 (Oph.)
Muspratt, J., 86 (Ent.)
Muzzolini, M., with Belloni, 163 (Hel.)

N

Naccache, R., 647 (Oph.)
Nagai, A., 286, 287, 530 (Hel.)
Nagano, K., with Hunter, Ritchie, Ishii, Murakuni, Pan, Weber, Szewczak & Asakura, 523 (Hel.)
——, with ——, ——, Tanabe, Pan & Yokogawa, 785 (Hel.)
——, with Ritchie, Hunter, Kaufman, Pan, Yokogawa, Szewczak, Hishinuma, Shimizu & Asakura, 881 (Hel.)
Nagao, I., 265 (Chl.)
Nahas, L., with Sampaio & de Souza Lima, 983 (Lep.)
Nair, C. P., with Jaswant Singh, 122 (Mal.)
——, with —— & Basu, 122 (Mal.)
——, with ——, —— & Ray, 19 (Mal.)
——, with —— & David, 674 (Mal.)
——, with —— & Ray, 369 (Mal.)
——, with Ray, Basu & Jaswant Singh, 1100 (Mal.)
——, Ray, A. P. & Jaswant Singh, 1100 (Mal.)
Nair, P. M., with Khan & Suri, 363 (Mal.)
——, with Najib Khan, Janaki & Suri, 663 (Mal.)
Nájera, L., 524 (Hel.)
Nájera, L. E., 162 (Hel.), 325 (Ent.)
Najim, A. T., (524) (Hel.)
Najib Khan, Janaki, L., Nair, P. M. & Suri, R. M., 663 (Mal.)
Naka, K., with Fukushima, Senda, Uenoyama, Inui, Ishigami, Kariya, Iwasaki & Sakao, (439) (Haem.)
Nakagami, S., Nakano, M., Kondo, A., Yaoi, H. & Otani, S., 387 (Rab.)
——, with Yaoi, Mikamo, Otani, Nakano & Konda, 388 (Rab.)
Nakagawa, Y., with Toda, 944 (Den.)
Nakamura, M., with Anderson, Hrenoff, Anderson & Contopoulos, 1121 (Am.)
—— & Anderson, H. H., 146, 397 (Am.)
Nakamura, N., with Asami, 772 (Am.)
Nakano, M., with Nakagami, Kondo, Yaoi & Otani, 387 (Rab.)
——, with Yaoi, Mikamo, Otani, Kondo & Nakagami, 388 (Rab.)

Nani, S., 249 (Tryp.)
Narayanan, K. G. A., with Dutta, (992) (Vms.)
Narumi, N., with Akimoto, (1061) (Hel.)
do Nascimento, R., with de Oliveira & de Andrade, 594 (Mal.)
Nash, T. A. M., 759 (Tryp.)
Nasir, A. S., with Rafi, 1093 (Mal.)
Nasir-Ud-Din, M., 843 (Mal.)
Nasiruddin, M., 88 (Ent.)
Nauck, E. G., (445) (Der.), (854) (Bart.)
Navarranne, P., with Camain & Ayite, 61 (Hel.)
——, with ——, Vernier & Ayite, (1133) (Hel.)
Navarro, L., with Downs & Bordas, 204 (Ent.)
Neal, R. A., 694, 860 (Am.)
—— & Hoare, C. A., 859 (Am.)
Neel, J. V., (794) , 794 (Haem.)
——, with Kaplan & Zuelzer, (439), (Haem.)
——, Wells, I. C. & Itano, H. A., 176 (Haem.)
Néel, R., with Colas-Belcour & Vervent, 698 (R.F.)
Neelakantan, L., Iyer, B. H. & Guha, P. C., (115), (116) (Mal.)
Neghme, A., with Agosin, Christen, Jarpa & Atias, 849 (Tryp.)
——, Agosin, M., Christen, R. & Rubio, M., 868 (Am.)
——, Badínez, O., Jarpa, A., Thiermann, E., Agosin, M. & Christen, R., 1104 (Tryp.)
—— & Bertin, V., 525 (Hel.)
——, with Christen, Agosin, Pino, Jarpa & Thiermann, (650) (Prot.)
—— & Silva, R., 47 (Am.)
——, Thiermann, E., Pino, F., Christen, R. & Agosin, M., 1157 (Prot.)
Neghme R., A., with Gutiérrez & Albí de la Fuente, 121 (Mal.)
——, Pilotti Avello, M. & Silva C., R., 705 (Hel.)
—— & Silva C., R., 144 (Am.)
Negroni, P., Gatti, J. C., Cardama, J. E., & Balina L. M., 646 (Der.)
Neher, M. B., with Hass & Blickenstaff, (454) (Ent.)
Nelson, R. H., with Gersdorff & Mitlin, 563 (Ent.)
——, with Mitlin & Gersdorff, 453 (Ent.)
Neri, P., with Rizzotti, 268 (Am.), 331 (Reports, etc.)
Nesbitt, P. E., with Unsworth, (936) (Tryp.)
Nesti, A., with de Freitas, Neto, de Andrade e Silva & Lima, (759) (Tryp.)
Neto, L. P. B., with Piza, de Macedo, Monteiro & Brandão, (257) (Typh.)
Neto, M. R., with de Freitas, Nesti, de Andrade e Silva & Lima, (759) (Tryp.)
Neuhaus, W., 785 (Hel.)
Neva, F. A. & Snyder, J. C., 1106 (Typh.)
Nevenić, V., with Gvozdenović, 607 (Leish.)
Newson, H. D., with Grundmann & Warnock, (1102) (Mal.)
New York Acad. Med., 331 (B.R.)
New York State Dept. of Health, 914 (Reports, etc.)
Newcomer, V. D., Wright, E. T. & Tamblyn, E. E., 995 (Der.)
Neyra Ramirez, J., 1125 (Lep.)
—— & Pesce, H., 1126 (Lep.)
Nguyên Dinh Cat, 446 (Oph.)
Nibley, C., Jr., with Hurlbut & Altman, 565 (Ent.)
Nicol, B. M., 790 (Def. Dis.)
Nicol, W. D., with Covell, 355 (Mal.)
Nigeria, 243 (Tryp.)
Nikolic, M., 946, 947 (Rab.)
Niño, F. L., 184 (Der.)
Nishimura, S., with Tanimura, 969 (Lep.)
Nishimura, T., 1139 (Hel.)
Niven, J. S. F., with Fulton, 251 (Leish.)
Noble, E. R., with McRary & Tondevold, 937 (Tryp.)
Noël, R., with Marie-Suzanne & Sohier, 55, 522 (Lep.)
Nolan, M. O., with Herdt & Loomis, 159 (Hel.)
Nolasco, J. O., 773 (Lep.)
Nomdedeu, G., with Floch, 699 (Lep.)
Nor El-Din, G., 116, 232 (Mal.), 636 (Hel.)
Nor El Din, G. & Dawood, M., 63 (Hel.)
Nor Eldin, G. & Morcos, F., 927 (Mal.)
Norcross, J. W., with Ross & Horrax, 973 (Hel.)
Norris, M. A., with Irons, Eads, Johnson & Walker, 499 (Typh.)
Northrop, A. K., Jr., with Bulger, 443 (Vms.)
Norton, L. B., with Hopkins & Gyrisco, (910) (Ent.)
Noury, M., 134 (Typh.)
Nozawa, R., with Harada, Miyagawa, Sukegawa & Tuboi, 139 (Pl.)
Nuñez, J. M., with Calero & Silva Goytía, 1108 (Tryp.)
Nushan, H. & Miller, B., (1123) (Am.)

O

Obata, Y., with Fukuzumi, 93, (93) (Ent.)
——, with —— & Kagiwada, 34 (Typh.)
Oberling, C. & Ansari, N., 679 (Leish.)
O'Brien, H. D., 550, (551) (Ulc.)
Ockerse, T., with le Riche, Riordan, Smit, Best, Kinnear, Walker, du Toit, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Oddo, F. G. & Bruno-Smiraglia, C., 845 (Mal.)
Ofstrock, A., with Murray, Cohen, Jampol & Snyder, 681 (Typh.)
——, with —— & Snyder, 610 (Typh.)
Ogasawara, F., with Arakawa & Tachibana, (1069) (Def. Dis.)
Ogata, T., with Kitaoka & Miura, 196 (Ent.)
Ohr, A., with Mohr, Berka & Knüttgen, 159 (Hel.)
Oike, K., with Miyake, Amoo & Fujimoto, (804), (Misc. Dis.)
Okuno, Y., with Inoki & Aoyama, 370 (Mal.)
——, with Taniguchi, Fujino & Inoki, 263 (Den.)
Oldroyd, H., 1091 (B.R.)
Olejnik, E. & Davidovitch, S., 143 (Chl.)
Oleson, J. J., with Little, 493 (Tryp.)
——, with Woll, 298 (Sp.)
Olin, W. G., Jr., with Steer & Burns, 44 (Rab.)
de Oliveira, L., de Andrade, R. M. & do Nascimento, R., 594 (Mal.)
de Oliveira, M. X., 373 (Mal.)
Olivier, L. & Stirewalt, M. A., 1056 (Hel.)
Olmos Castro, N. & Bonatti, A. A., 408 (Lep.)
Omori, N. & Sakakibara, M., 924 (Mal.)
O'Neill, J. J. M., with Baker, 537 (Haem.)
Onul, B., 609 (Typh.)
Oomen, H. A. P. C., 1075 (Misc. Dis.)
Oosterhuis, G. J., 663 (Mal.)
Openshaw, H. T. & Wood, H. C. S., (620) (Am.).
Oravisto, T., with Teraskeli, 308 (Oph.)
Orbaneja, J. G., Such, M. & Perez, A. G., 1131 (Lep.)

Ormerod, W. E., with Hawking, Thurston & Webber, 1143 (Hel.)
Ormsbee, R. A., 502, 612 (Typh.)
——, Lackman, D. B. & Pickens, E. G., 259 (Typh.)
—— & Pickens, E. G., 613 (Typh.)
O'Rourke, F. J., with Davey, 289 (Hel.)
Orrahood, M. D., with Wyatt, 716 (Haem.)
Osbond, J. M., (400) (Am.)
Otani, S., with Nakagami, Nakano, Kondo & Yaoi, 387 (Rab.)
——, with Yaoi, Mikamo, Nakano, Kondo & Nakagami, 388 (Rab.)
Otten, E., Piekarski, G. & Westphal, A., (191) (Prot.)
——, Westphal, A. & Kajahn, E., 190, 650 (Prot.)
Otto, G. F., Brown, H. W., Bell, S. D., Jr. & Thetford, N. D., 982 (Hel.)
Otto, R., 385 (Typh.)
Ouchi, K. & Kakizaki, C., (1061) (Hel.)
van Oye, E. & Charles, P., 229 (Mal.), 552 *bis* (Misc. Dis.), 732 (Reports, etc.), 992 (Haem.)
Ozawa, K., with McMullen, Komiyama, Ishii, Endo-Itabashi, Asakawa & Mitoma, 416 (Hel.)

P

Pacheco, G. & Jansen, J., 415 (Hel.)
Pages, (545) (Oph.)
Pagès, R., (311), (803) (Oph.)
——, Paqui, A. & Dernoncourt, Y., 1073 (Oph.)
Pal, R., 90 (Ent.)
——, with Jaswant Singh & Sharma, 753 (Mal.)
Pales, L. & Linhard, J., 304 (Haem.)
Pan, C., with Hunter & Kaufman, 879 (Hel.)
——, with ——, Ritchie, Kaufman, Yokogawa, Ishii, Szewczak, Weber, Asakura, Hishinuma & Williams, 633 (Hel.)
——, with ——, —— & Lin, 1050 (Hel.)
——, with ——, ——, Nagano, Ishii, Murakuni, Weber, Szewczak & Asakura, 523 (Hel.)
——, with ——, Ritchie, Tanabe, Nagano & Yokogawa, 785 (Hel.)
——, with Ritchie, Hunter, Kaufman, Nagano, Yokogawa, Szewczak, Hishinuma, Shimizu & Asakura, 881 (Hel.)
——, with ——, ——, Szewczak, Izumi, Weber, Hishinuma & Asakura, 523 (Hel.)
Pan American Sanitary Bureau, 531 (Hel.)
Pandit, S. R., 396 (Chl.)
——, with Ahuja, Krishnan & Venkatraman, 394 (Chl.)
Panja, D., 1155 (Ulc.)
Panja, G., with Sodeman & Lahiri, 1155 (Ulc.)
Paparella, J. A., with Aquilina, 1024 (Mal.)
Paqui, A., with Pagès & Dernoncourt, 1073 (Oph.)
Pará, M., 972 (Hel.)
Paraense, W. L., 488 (Mal.), 779 (Hel.)
Parande, A.S., (1095) (Mal.)
Paredes E., M., with Ruiz Sanchez, Casillas & Riebeling, (233) (Mal.)
——, with Ruiz-Sanchez, ——, Velazquez & Riebeling, 597 (Mal.)
Paredes, M., with Ruiz Sanchez, Legoff & Riebeling, 12 (Mal.)
Paris, C. & Gallut, J., 395 (Chl.)
Parker, A. H., 1001 (Ent.)
Parker, R. T., with Workman, Hightower, Borges & Furman, 1037 (Typh.)
Parlange, J. A., with Ferrand, 307, 445, 801 (Oph.)
Paroni, F., 786 (Hel.)
Parrot, L., 608 (Leish.)
—— & Bellon, J., (909) (Ent.)
—— & Clastrier, J., (1083) (Ent.)
Pasca, G., with Bietti, 312 (Oph.)
Pascale, H., (496) (Leish.)
Pascual, C. R., with Salcedo, Regala, Santiago, Intengan, Bautista, Bocobo & Concepcion, (75) (Def. Dis.)
Passos, A. C. de M., Baptista, L., Martins, A. B. C. N., Sampaio, B. P., Silveira, H. & Marques, A. R., 1126 (Lep.)
Patel, J. C., (888) (Hel.)
Patel, T. B. & Rodda, S. T., 1113 (Pl.)
Paterson, P. Y., with Smadel, Ley, Diercks, Wisseman & Traub, 682 (Typh.)
Pätiälä, R. & Raekallio, T., (967) (Lep.)
Patterson, R. H., Wilson, H. & Diggs, L. W., 538 (Haem.)
Paul, J. H., with Watson, Chow & P'Eng, 12 (Mal.)
Paul, J. J., with Dicke, 560 (Ent.)
Pavilanis, V., Lepine, P. & Morisset, N., 766 (Typh.)
Pavišić, V., (85) (Ent.)
Pavlević R., with Murray, Pšorn, Djaković, Sielski, Broz, Ljupša, Gaon, & Snyder, 383 (Typh.)
Pavlov, P. & Georgiev, B., (1005) (Ent.)
Pavlovsky, E. N., 459 (B.R.)
Payne, E. H. & Urteaga, O., 40 (Bart.)
——, Villarejos, V. M., Sharp, E. A., Reinertson, J. W. & Wille, W. S., 481 (Mal.)
Peacock, P. N. B., with Annecke, 60 (Hel.)
Peckenschneider, L. E., Pokorny, C. & Hellwig, C. A., (909) (Ent.)
Pedreira de Freitas, J. L., 127 (Tryp.)
—— & Mendonça, W., 27 (Tryp.)
Peel, E., with Chardome, 982 (Hel.)
Peers, J. H., with Hottle, Morgan & Wyckoff, 264 (Rab.)
Pellegrino, J., 494 (Tryp.)
——, Borrotchin, M., Leite, G. & Brener, Z., 678 (Tryp.)
—— & Brener, Z., 1034 (Tryp.)
Peltonen, T., 998 (Prot.)
P'Eng, R. Y., with Watson, Paul & Chow, 12 (Mal.)
Penido, H. M., Pinto, D. B. & Deslandes, N., 701 *bis* (Hel.)
——, with Pinto & Robert, 702 (Hel.)
Pennec, J., 521 (Lep.)
Péquignot, H., with Worms, Giroud & Israël, 383 (Typh.)
Péra, J. S., 495 (Tryp.)
Pereira, R. B., 1136 (Hel.)
Perepérez Palau, F., 853 (Typh.)
Perez, A. G., with Orbaneja & Such, 1131 (Lep.)
Pérez Gallardo, F., Clavero, G. & Hernández, S., 938 (Typh.)
Pérez Santiago, E., with Diéz Rivas, Suárez & Hernández Morales, 991 (Sp.)
Pérez Sorá, E., with López Fernández & Arocha Machado, 689 (Rab.)
Péronnet, M., with Molinier & Maitre, (793) (Sp.)
Perry, A. S. & Hoskins, W. M., 561 *bis* (Ent.)

Perry, M. W., (510) (Am.)
Perttunen, V., 759 (Tryp.)
Pesce, H., 872 (Lep.)
——, with Neyra Ramirez, 1126 (Lep.)
Pesigan, T. P., 975 (Hel.)
—— & Masiluñgan, V. A., 282 (Hel.)
Pessôa, S. B., 334 (B.R.)
—— & Coutinho, J. O., 876 (Hel.)
Peter, H., with Siegert, Simrock & Schweinsberg, 499 (Typh.)
Peters, D. & Wigand, R., 854 (Bart.)
Peters, R. F., with Gjullin, 1080 (Ent.)
Peterson, A., 554 (Ent.)
Peterson, D. G. & Brown, A. W. A., 322 (Ent.)
Petges, G., with Joulia & Texier, 403 (Lep.)
Petri, K., with Kirchberg, 85 (Ent.)
Petrova-Piontkovskaya, S. P., with Korshunova, 765 (Typh.)
Pétrovitch, Z., with Simitch, 512 (Am.)
Pfeuffer, F., with Blaas, 423 (Hel.)
Pfister, R., 1065 *bis* (Hel.)
——, with Jonchère, 590 (Mal.)
Pham van Tien, 548 (Oph.)
Phelps, V. R., with Wasserman & Hertzog, 1070 (Haem.)
Philip, C. B., 765 (Typh.)
—— & Kohls, G. M., 498 (Typh.)
——, with Larson, Wicht & Hughes, 265 (Pl.)
——, with Wharton, Jenkins, Brennan, Fuller & Kohls, 93 (Ent.)
Phillips, B. P., 150 (Am.)
Phipps, J., 226 (Mal.)
Pick, F., 427 (Hel.), 731 (Ent.), (1033) (Tryp.)
Pickens, E. G., with Ormsbee, 613 (Typh.)
——, with —— & Lackman, 259 (Typh.)
Pickup, J. D. & Riley, I. D., 316 (Misc. Dis.)
Piekarski, G., with Lüdicke, 839 (Mal.)
——, with Otten & Westphal, (191) (Prot.)
Pieters, G., (536) (Haem.)
——, with Vandepitte, (1150) (Haem.)
——, with Verhaegen, (1102) (Tryp.)
Piette, M., with Siguier, Feld, Welti & Lumbroso, 882 (Hel.)
Pille, G., 722 (Heat Str.)
Pilotti, M. & Faiguenbaum, J., 528 (Hel.)
Pilotti Avello, M., with Neghme & Silva, 705 (Hel.)
Pimental, D., Dewey, J. E. & Schwardt, H. H., 90 (Ent.)
Pinkerton, H., with Greiff, 609 (Typh.)
Pinotti, M., 733 (Reports, etc.)
Pinna, P., 113 (Mal.)
Pino, F., with Christen, Agosin, Jarpa, Theirmann & Neghme, (650) (Prot.)
——, with Neghme, Thiermann, Christen & Agosin, 1157 (Prot.)
Pinto, D. B., with Penido & Deslandes, 701 *bis* (Hel.)
——, Robert, C. & Penido, H. M., 702 (Hel.)
Pinto, M. R., (943) (Y.F.)
——, with Fonseca, 258 (Typh.)
Pinto, O. da S., with de Bustamante, Guedes Xavier & Freitas, 17 (Mal.)
Pipkin, A. C., with Azar & Tabbara, 413 (Hel.)
——, Rizk, E. & Balikian, G. P., 421 (Hel.)
Pires, C. D. de A., with Amaral, (771) (Am.)
Pires, F. M. & de Almeida, C. L., 492 (Tryp.)
Pirzada, M. A. & Kapur, P. N., 440 (Haem.)
Pitchford, R. J., 1053 (Hel.)
Piza, J. de T., de Macedo, J. J., Monteiro, E. L., Brandão, C. H. & Neto, L. P. B., (257) (Typh.)
Pizarro Suárez, E., with Campillo Sáinz & Roch Ubiría, 137 (Rab.)
Pizzi, M., 962 (Lep.)
Pizzi, T., 382 (Tryp.)
Pizzi P., T., with Schenone, Badínez, Vásquez & Corres, (1103) (Tryp.)
Plackett, R. L., 624 (R.F.)
Ployé, M., 397 (Am.)
——, with Winckel, (230) (Mal.)
Plumauzille, J., (524) (Hel.)
Pöhn, H. P., 47 (Am.)
Poindexter, H. A., 188 (Ulc.), 627 (Lep.)
Poirier, M. & Deschiens, R., 530 (Hel.)
Pokorny, C., with Peckenschneider & Hellwig, (909) (Ent.)
Poleff, L., 312, 446 (Oph.), 739 (B.R.)
Polish Parasitological Society, 657 (Reports, etc.)
Pollack, A. D., with Victor, Raymond, Valliant & Wagner, 501 (Typh.)
Pollitzer, R., 388, 616, 690, 857 (Pl.)
Polosa, P., with Curcio, 229 (Mal.)
Poncet, A., with Sergent, 756 *bis*, 934 (Mal.), 959 (R.F.)
Porte, L., with de Lajudie & Brygoo, 724 (Misc. Dis.)
Portella, O. B. & de Almeida, J. O., 1128 (Lep.)
Porter, R. J., Laird, R. L. & Dusseau, E. M., 1102 (Mal.)
Portier, A., Boulard, C. & Massonnat, J., (609) (Leish.)
——, Messerschmitt, J. & Massonnat, J., (641) (Haem.)
Portugal, H., 873 (Lep.)
Poštić, S., 802 (Oph.)
Postlewaite, J. C., with Jenkins, 544 (Der.)
Potash, L., with Fuller, Murray, Ayres & Snyder 35 (Typh.)
Poti, S. J., with Chaudhuri, Chakravarty & Rai Chaudhuri, 595 (Mal.)
Potts, W. H. & Jackson, C. H. N., 1030 (Tryp.)
Poul, J., with Gayot & Choquette, 506 (Rab.)
Pournaki, R., with Baltazard, Bahmanyar & Mofidi, 957 (R.F.)
Pradhan, S. N., 1153 (Vms.)
Prakash, S., with Singh & Ramakrishnan, 480 (Mal.)
Pratt, H. D., (1002) (Ent.)
Pratt, J. J., Jr., with Babers, 1004 (Ent.)
Preston, P. J., (621) (Am.)
Preuss, G., with Binde, Kramer & Weyer, 497 (Typh.)
Prévot, A. R., 643 (Vms.)
Prévot, R., Hornbostel, H. & Dörken, H., 636 (Hel.)
Pridie, E. D., 1165 (Reports, etc.)
Prieto Lorenzo, A., 1050 (Hel.)
——, with Aparicio Garrido, 529 (Hel.)
—— & Fernández Nafria, A., (622) (Am.)
Primosigh, J., with Slotta, (80), 1071 (Vms.)
Prince, F. M., with Eskey & Fuller, 265 (Pl.)
Pringle, G., 359 (Mal.)
Provasoli, L., with Hutner, 460 (B.R.)
Pšorn, T., with Murray, Djaković, Sielski, Broz, Ljupša, Gaon, Pavlević & Snyder, 383 (Tryp.)
Puech, J., 1000 (Prot.)
——, with Callot, 999 (Prot.)
Pugsley, W. S., with Stone & Tool, 851 (Leish.)

Pullar, A. J., 308 (Oph.)
Pupo, J. de A., 874 (Lep.)
Puttanna, S. T., 185 (Oph.)
Puyuelo, R. & Holstein, M. M., 71 (Hel.)
——, with Toulant & Robineau, 81 (Oph.)
Pynaert, L., with de Wildeman, (1049) (Lep.)

Q

Qazilbash, N. A., (530) (Hel.)
Quagliato, R., 406 (Lep.)
Quan, S. F., with Chen & Meyer, 617 (Pl.)
Quarterman, K. D., with Sumerford, Goette & Schenck, 91 (Ent.)
Quin, P., with Annecke, 869 (R.F.)
Quinby, G. E. & Welch, S. F., 923 (Mal.)
Qutub-Ud-Din, M., 195, 1078, (Ent.), 496 (Leish.), 979 (Hel.)

R

Rabkin, J. & Javett, S. N., 554 (Prot.)
Rachou, R. G., 17, 483 (Mal.)
——, with de Carvalho, 1021 (Mal.)
——, with Ferreira & Lima, 18 (Mal.)
Rademecker, M. A., with Dubois, 408 (Lep.)
Radke, R. A., 48, 619 (Am.)
Radloff, G., with Esrachowitz, Friedlander & Saunders, 716 (Haem.)
Raeburn, J., with Mackie, (700), 882 *bis*, (Hel.)
Raekallio, T., with Pätiälä, (967) (Lep.)
Raffaele, G., 840 (Mal.)
Raffo, P., with Droguett del Fierro, Cabezas & Moreno, 78 (Vms.)
Rafi, S. M. & Nasir, A. S., 1093 (Mal.)
—— & Shah, I. A., 368 (Mal.)
Rageau, J., 453 (Ent.), 496 (Leish.)
——, with Colas-Belcour, 556 (Ent.)
Raghavan, N. G. S., 708 (Hel.)
——, with Jaswant Singh, 70 (Hel.)
——, Misra, B. G. & Roy, R., 1140 (Hel.)
Ragusa, G., 620 (Am.)
Ragusin, E., 626 (Lep.)
Rahim, A., with Mohi-Ud-Din, 477 (Mal.)
Rai Chaudhuri, M. N., with Chaudhuri, Chakravarty & Poti, 595 (Mal.)
——, with —— & Dutta, 1098 (Mal.)
Railsback, O. C., with Clark, Lennette & Romer, 136 (Typh.)
Raina, B. L., 210 (B.R.)
Rajalakshmi, K., with Khanolkar, 1048 (Lep.)
Rajendram, S. & Jayewickreme, S. H., 667 *bis*, 749 (Mal.)
Ramachandra Rao, T., with Viswanathan, Halgeri & Karandikar, 359 (Mal.)
——, with —— & Juneja, 118 (Mal.)
Ramachandran, K., 618 (Pl.)
Ramakrishnan, S. P. & Satya Prakash, 371, 372 (Mal.)
——, with Singh & Prakash, 480 (Mal.)
——, Young, M. D., Jeffery, G. M., Burgess, R. W. & McLendon, S. B., 924 (Mal.)
Raman, M. V., with Swaroop, 140 (Chl.)
Ramas, R., 703 (Hel.)
Ramaswamy, A. S., with Rao & De, 123 (Mal.)
Ramsay, J. A., (678) (Tryp.)
Ranade, S. N., with Gollerkeri & Gokhale, 1049 (Lep.)
Randall, J. H., with Stuermer & Stein, 192 (Prot.)
Rankine, A., 366 (Mal.)
Ranque, J., Depieds, R. & Cabassu, H., 130 (Leish.)
Rao, C. K. P. & Krishnan, P., 997 (Misc. Dis.)
Rao, K. A., 769 (Pl.)
Rao, K. N. A., (853) (Typh.)
——, with Kalra, 868 (R.F.), 939, 940 (Typh.)
Rao, K. S., with Gopalan, Venkatachalam & Menon, 987 (Def. Dis.)
Rao, P. V., with Macdonald, 10 (Mal.)
Rao, R. R., Ramaswamy, A. S. & De, N. N., 123 (Mal.)
Rao, V. G., 268 (Am.)
Raper, A. B., (893) (Haem.)
Raphael, E. R., with Sakon & Kohn, 548 (Oph.)
Rappaport, I., with Loughlin, Joseph & Mullin 424 (Hel.)
——, with ——, Mullin, Wells, Joseph & Shookhoff, 712 (Hel.)
——, with ——, Rice, Wells, Joseph & Rene, 751 (Mal.)
——, with Wells, Shookhoff, Mullin, Sterman & Loughlin, 639 (Hel.)
Rasson, G. & Thys, A., (306) (Der.)
Ratcliffe, F. N., with Mackerras, Gilmour & Mules, 119 (Mal.)
Ravaioli, L., with Babudieri, 260 (Typh.)
Ray, A. P., with Jaswant Singh & Nair, 369 (Mal.)
——, with ——, —— & Basu, 19 (Mal.)
——, with Nair & Jaswant Singh, 1100 (Mal.)
——, Nair, C. P., Basu, P. C. & Jaswant Singh, 1100 (Mal.)
Raymond, R., with Victor, Valliant, Wagner & Pollack, 501 (Typh.)
Ré, L., with Leite, (996) (Der.)
Read, C. P., (421), 1059 (Hel.)
Reagan, R. L. & Brueckner, A. L., 614 (Rab.)
——, with Haedicke, Schenck & Brueckner, 966 (Lep.)
——, Lineweaver, H. O., Schenck, D. M. & Brueckner, A. L., 137 (Rab.)
Reardon, L. V., with Tobie, Bozicevich, Shih, Mantel & Thomas, 267 (Am.)
——, Verder, E. & Rees, C. W., 860 (Am.)
Recio, P. M., 65 (Hel.)
Redaelli, P., Cavallero, C., Borasi, M., Sala, G. & Amira, A., 444 (Der.)
Redmond, W. B., 672 (Mal.)
Redstone, I., with Foster & Leitch, 414 (Hel.)
Reed, J. G., 98 (Reports, etc.)
Reeder, W. H. & Goodrich, B. E., 997 (Misc. Dis.)
Rees, C. W., with Baernstein, (1033) (Tryp.)
——, with Reardon & Verder, 860 (Am.)
Reeves, W. C., with Rosen & Aarons, (729) (Ent.)
—— & Rudnick, A., 86 (Ent.)
Regala, A. C., with Salcedo, Pascual, Santiago, Intengan, Bautista, Bocobo & Concepcion, (75) (Def. Dis.)
Reid, D. H., with Luongo & Weiss, 432 (Hel.)
Reid, J. A., 235 (Mal.)
——, with Ganapathipillai, A., 1158 (Ent.)
—— & Wharton, R. H., 1100 (Mal.)
Rein, C., Kitchen, D., Marquez, F. & Varela, G., 542 (Der.)
Reinertson, J. W., with Payne, Villarejos, Sharp & Wille, 481 (Mal.)

Reinertson, J. W., with Thompson, 511 (Am.)
Reiss, H. J. & Verron, G., 906 (Prot.)
Reizes, C., with Giroud & Jadin, 32 (Typh.)
——, with Le Gac, Giroud & Chamard, 36 (Typh.)
Remião, M. S., with de Moura, (509) (Pl.)
Remlinger, P., 945, 947, (1041) (Rab.)
——, & Bailly, J., 264, (264), (387), (1111) (Rab.)
Rene, H., with Loughlin, Rice, Wells, Rappaport & Joseph, 751 (Mal.)
Renjifo, S., with Groot & Uribe, 760 (Tryp.)
Renjifo, S., Sanmartín, C. & de Zulueta, J., (935), (Mal.)
Repass, R. P., with Kartman, 1094 (Mal.)
Resnick, S. L. & Crowell, R. L., 199 (Ent.)
Rev. Brasileira Leprologia, 870 (Lep.)
Reynaud, J., 189 (Misc. Dis.)
Reynaud, R., with Monnet & Baylet, 1030 (Tryp.)
Reynes, V., 461 (B.R.), 1043 (Pl.)
Reynolds, F. W., Guthe, T. & Samame, G., 152 (Ys.)
Rhodes, K., 892 (Def. Dis.)
——, with Hill & Escoffery, 515 (Ys.)
——, with ——, —— & Murray, 515 (Ys.)
——, with ——, Stafford & Aub, 437 (Def. Dis.)
Rhodesia, Southern, 208, 810 (Reports, etc.), 366 (Mal.), (700) (Hel.)
Ribas Mujal, A., with Ferrer, 627 (Lep.)
Ricci, M., 267 (Am.), 293, 294, 710 (Hel.)
Rice, J. B., with Loughlin, Wells, Rappaport, Joseph & Rene, 751 (Mal.)
Richard, D. R., with Wilson & Munro, 599 (Mal.)
Richards, A. G., (651) (Ent.)
Richards, W. R., with Hocking, 1082 (Ent.)
Richardson, A. P., with Stauber & Walker, 124 (Mal.)
Richart, F. E., Jr., with Chang, 479 (Mal.)
——, with Fair & Chang, 480 (Mal.)
Richfield, D. F., with Goldman & Rockwell, 1077 (Ent.)
le Riche, H., Riordan, D., Smit, R., Ockerse, T., Best, P., Kinnear, A. A. & Walker, A. R. P., with du Toit, D., Gerdener, J. L., Seward, J., Steinbach, L. & Drysdale, B., 714 (Def. Dis.)
Riddick, J. A., with Jones, (731) (Ent.)
Riebeling, Q. B. R., with Ruiz Sanchez, Legoff & Paredes, 12 (Mal.)
——, with ——, Paredes & Castillas, (233) (Mal.)
Riebeling, R., with Ruiz-Sanchez, Casillas, Paredes & Velazquez, 597 (Mal.)
van Riel, J., Hiernaux-l'Hoëst, D. & Hiernaux-l'Hoëst, J., 374 (Mal.)
Riley, I. D., with Pickup, 316 (Misc. Dis.)
Rindani, T. H., (796) 1072 (Vms.)
Ringler, W., with Werle, (165) (Hel.)
Riordan, D., with le Riche, Smit, Ockerse, Best, Kinnear, Walker, du Toit, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Risi, J. B., 405 (Lep.)
Ritchie, L. S., with Hunter, Chang *et al.*, 1050 (Hel.)
——, Hunter, G. W., Kaufman, E. H., Jr., Pan, C., Nagano, K., Yokogawa, M. & Szewczak, J. T. with Hishinuma, Y., Shimizu, M. & Asakura, S., 881 (Hel.)
——, with Hunter, Kaufman Pan, Yokogawa, Ishii, Szewczak, Weber, Asakura, Hishinuma & Williams, 633 (Hel.)
——, with Hunter, Nagano, Ishii, Murakuni, Pan, Weber, Szewczak & Asakura, 523 (Hel.)
Ritchie, L. S., with Hunter, Pan & Lin, 1050 (Hel.)
——, Hunter, G. W., Pan, C. & Szewczak, J. T., with Izumi, S., Weber, R. E., Hishinuma, Y. & Asakura, S., 523 (Hel.)
——, with Hunter & Tanabe, 416 (Hel.)
——, with ——, ——, Nagano, Pan & Yokogawa, 785 (Hel.)
Rizk, E., with Pipkin & Balikian, 421 (Hel.)
Rizzotti, G. & Neri, P., 268 (Am.), 331 (Reports, etc.)
Roach, E. B., with McDonald & Miller, 375 (Bl.)
Robert, C., with Pinto & Penido, 702 (Hel.)
Roberts, E. W., with Bertram & Edwards, 1009 (Ent.)
Robineau, G., with Toulant & Puyuélo, 81 (Oph.)
Robinson, G. G., 728 (Ent.)
Robledo, J. L., 410 (Lep.)
Roch, E., with Bustamante & Varela, 135 (Typh.)
Roch Ubiría, E., with Campillo Sáinz & Pizarro Suárez, 137 (Rab.)
Roche, M., Convit, J., Medina, J. A. & Blomenfeld, E., 58 (Lep.)
Rockefeller Foundation. International Health Division, 454 (Reports, etc.)
Rockenbach, J., with Seneca, 1033 (Tryp.)
Rockenmacher, M., James, H. A. & Elberg, S. S., 1112 (Pl.)
Rockwell, E., with Goldman & Richfield, 1077 (Ent.)
Rodda, S. T., with Patel, 1113 (Pl.)
Rodhain, J., 319 (Prot.), 1064 (Hel.), (1101) (Mal.)
—— & Demuylder, C., (322) (Prot.)
—— & Gerebtzoff, M. A., 192 (Prot.)
—— & Vincke, I., 932 (Mal.)
Rodríguez, C. & Adrianza H., M., 147 (Am.)
Rodriguez, J. N., with Guinto, Doull & Bancroft, 54 (Lep.)
Rodríguez, R., 1154 (Der.)
Rodríguez Salinas, E., with Basnuevo, Lavín, Borbolla, Costales & Cepero, 639 (Hel.)
Rogers, L. & Muir, E., 339 (B. R.)
Rollier, R., (776) (Lep.)
Rollo, I. M. & Williamson, J., 624 (R.F.)
Romaña, C., (937) (Tryp.)
—— & Kirschbaum, M., 380 (Tryp.)
—— & de Mondolfo, A. A., 381 (Tryp.)
—— & Toranzos, L. B., 381 (Tryp.)
——, —— & Marcolongo, R., 426 (Hel.)
Romeiro, L., Kemp, H. & Barragat, P., 558 (Ent.)
Romeo Viamonte, J. M. & Castro, M., 908 (Ent.)
Romer, M. S., with Clark, Holmes, Welsh, Lennette & Abinanti, 38 (Typh.)
——, with —— & Lennette, 38, 258 (Typh.)
——, with ——, —— & Railsback, 136 (Typh.)
Roovers, J. J. C. P. A. & van Steenis, P. B., 399, 863 (Am.)
van Rooyen, C. A., 1098 (Mal.)
Rosário, J. M., with Ferreira, 490 (Tryp.)
Rosas Costa, G. A., 144 (Am.)
Rose, E., with Kvittingen, Cutler, Guevara, McCullough, Ford, Tampi, Sen, Lakshwir, Khan & Dass, 967 (Lep.)
Rose, F. L., with Carrington, Crowther, Davey & Levi, 362 (Mal.)
Rosen, E., 531 (Hel.)
Rosen, L., 166 (Hel.)
——, Reeves, W. C. & Aarons, T., (729) (Ent.)
Rosický, B., with Havlík, (1021) (Mal.)

Ross, G. L., Norcross, J. W. & Horrax, G., 973 (Hel.)
Ross, H. & Gemar, F., 58, 627 (Lep.)
Ross Institute Industrial Advisory Committee, 558 (Ent.)
Rotberg, A., 30 (Leish.)
—— & Bechelli, L. M., (412) (Lep.)
——, with Bechelli, 1089 (B.R.)
Roth, A. R., with Hoffman & Lindquist, 452 (Ent.)
——, with ——, —— & Butts, (808) (Ent.)
——, with Lindquist, Hoffman & Butts, 561 (Ent.)
Roth, L. M., 943 (Y.F.)
—— & Willis, E. R., 909 (Ent.)
Rouby, M., with Giroud, Le Gac, Lagarde & Gaillard, 256 (Typh.)
Rouby, M., with Le Gac & Dieng, (1110) (Y.F.)
——, with ——, Giroud & Lagarde, (386) (Typh.)
Row, P., 1064 (Hel.)
Row, R., 155 (Lep.)
Roy, A. T., 411, 968 (Lep.)
Roy, B. B., with Chatterjee, (164) (Hel.), 621 (Am.)
Roy, D. M., 190 (Misc. Dis.)
Roy, D. N., with Mitra, (1083) *bis* (Ent.)
Roy, R., with Raghavan & Misra, 1140 (Hel.)
Roy, S. K., with Das, 856 (Rab.)
Rozeboom, L. E., (322), (1002), (Ent.), 839 (Mal.)
——, with Mattingly, Knight, Laven, Drummond, Christophers & Shute, 651 (Ent.)
Rubio, M., with Neghme, Agosin & Christen, 868 (Am.)
Rudnick, A., with Reeves, 86 (Ent.)
Rudra, M. N., 1075 (Misc. Dis.)
——, Chowdhury, L. M. & Sinha, S. P., 904 (Misc. Dis.)
Ruggieri, G. & Cali', G., 273 (Am.)
Ruiz, J. M., 1072 (Vms.)
Ruiz Reyes, F., (710) (Hel.)
Ruiz-Sanchez, F., Casillas, J., Paredes E., M., Velazquez, J. & Riebeling, R., 597 (Mal.)
Ruiz Sanchez, F., Legoff, I., Paredes, M. & Riebeling, Q. B. R., 12 (Mal.)
——, Paredes E., M., Casillas, J. & Riebeling, Q. B. R., (233) (Mal.)
Rule, W., 597 (Mal.)
——, with Kellersberger, 410 (Lep.)
Russell, P. F., 14, 749, 1020 (Mal.), 734 (B.R.)
Ryan, J. E. & Fuller, R. H., 77 (Haem.)
Ryckman, R. E., (325), (Ent.), 937 (Tryp.)
—— & Halstead, B. W., (1162) (Ent.)
Ryley, J. F., 129 (Tryp.)

S

de Sa, A. E. & Kothare, S. N., (636) (Hel.)
de Sá, J. G., with de Souza-Araujo, 773 (Lep.)
Sabin, A. B., 504, 686 (Den.)
Saccà, G., (1003) (Ent.)
Saccharin, H., with Casile, (638) (Hel.)
Sadoughi, G., 546 (Oph.)
Saenz, B., 521 (Lep.)
Safford, J. W., 945 (Rab.)
Sagher, F., with Dostrovsky & Zuckerman, 1104 (Leish.)
Saha, H. & Das, A., 46, 1115 (Chl.)
Saint-Cyr, C., with Montestruc, 903 (Ulc.)
——, with —— & Vertueux, 314 (Ulc.)
Saiz Moreno, L., (884) (Hel.)
Sakakibara, M., with Omori, 924 (Mal.)
Sakao, K., with Fukushima, Senda, Uenoyama, Inui, Ishigami, Kariya, Naka & Iwasaki, (439) (Haem.)
Sakon, H., Kohn, M. & Raphael, E. R., 548 (Oph.)
Sala, G., with Redaelli, Cavallero, Borasi & Amira, 444 (Der.)
Salah, A. A., with Holway & Mitchell, 729 (Ent.)
Salah, M. K., with Khalifa, 1146 (Haem.)
Salazar y Cruz, S., (964) (Lep.)
Salcedo, J., Jr., with Burch, Carrasco & Intengan, 791 (Def. Dis.)
——, Regala, A. C., Pascual, C. R., Santiago, L. C., Intengan, C. L., Bautista, A. P., Bocobo, D. L. & Concepcion, I., (75) (Def. Dis.)
Saliba, F., with Amorin & de Mello, 1071 (Vms.)
Salomon, L., with Tzanck & Basset, 1129 (Lep.)
Salou, G., 442 (Vms.)
Samame, G., with Reynolds & Guthe, 152 (Ys.)
Sampaio, B. P., with Passos, Baptista, Martins, Silveira & Marques, 1126 (Lep.)
de Sampaio, L. F., 382 (Leish.)
Sampaio, S., de Souza Lima, L. & Nahas, L., 873 (Lep.)
Sandars, D. F., 417 (Hel.)
Sandosham, A. A., (224) (Mal.), 786 (Hel.), 1087 (Reports, etc.)
Sandoval, A. M., Beltrán, E. & Downs, W. G., (196) (Ent.)
Sanmartín, C., with Renjifo & de Zulueta, (935) (Mal.)
Santiago, L. C., with Salcedo, Regala, Pascual, Intengan, Bautista, Bocobo & Concepcion, (75) (Def. Dis.)
Santos, J. A., 275 (Am.)
Sanyal, N., 1155 (Ulc.)
Sapero, J. J., Lawless, D. K. & Strome, C. P. A., 727 (Prot.)
Sarandria, J. L., with Wertman, 256 (Typh.)
——, with —— & Crisley, 1107 (Typh.)
Sarkar, J. K., with De & Tribedi, 618 (Chl.)
Sarkar, N. K., 441 (Vms.)
Sarkaria, D. S. & Brown, A. W. A., 196 (Ent.)
——, with Brown & Thompson, 196 (Ent.)
Sarkies, J. W. R., 896, 901 (Oph.), 1066 (Hel.)
Sasa, M., (809) (Ent.)
—— & Ishimura, K., (87) (Ent.)
—— & Kano, R., (87) (Ent.)
Sasaki, Y., with Itô & Itô, 186 (Oph.)
Sass, M., 795 (Haem.)
Sato, A. & Wako, H., (641) (Def. Dis.)
Sato, K., with Akimoto, Atsumi & Asakura, (1061) (Hel.)
——, with Kano, (92), (808) (Ent.)
——, with —— & Tange, (92) (Ent.)
Sato, S., 1050, 1125 (Lep.)
—— & Chida, F., 1050 (Lep.)
Satya Prakash, with Ramakrishnan, 371, 372 (Mal.)
Saunders, G. F. T., 1030 (Tryp.)
Saunders, S., with Esrachowitz, Friedlander & Radloff, 716 (Haem.)
Sausse, A., 315 (Misc. Dis.)
Sautet, J., 1027 (Mal.)
Savage, A. & McTavish, W. B., 487 (Mal.)
Sayad, W. Y., with Faust, Agosín, Garcia-Laverde, Johnson & Murray, 980 (Hel.)
Sayer, W. J., with Ley, Hobson, Vanreenen, Tipton, Frick, Ballard & Traub, 274 (Am.)
Schapiro, M. M., 419 (Hel.)

Scheecqmans, G., with Lagrange, 524 (Hel.)
Scheibe, G., 429 (Hel.)
Scheid, G., with Bergstermann & Mendheim, 568 (B.R.)
——, with Mendheim & Schmidt, 707 (Hel.)
Schenck, D. M., with Haedicke, Reagan & Brueckner, 966 (Lep.)
——, with Reagan, Lineweaver & Brueckner, 137 (Rab.)
Schenck, S. L., with Sumerford, Goette & Quarterman, 91 (Ent.)
Schenone F., H., Pizzi P., T., Badínez S., O., Vásquez M., J. & Correa T., E., (1103) (Tryp.)
Schiavi, A., with Corrêa, 494 (Tryp.)
Schleich, F., with Kleinschmidt, 124 (Tryp.)
Schlesinger, P., with Benchimol, 640 (Def. Dis.)
Schlesinger, R. W. & Frankel, J. W., 688 (Den.)
Schmid, E. E. & Dassanayake, W. L. P., 71 (Hel.)
——, Jayasundera, L. B. T. & Velaudapillai, T., 1109 (Typh.)
—— & Thillainathan, P., 409 (Lep.)
Schmidt, J., with Mendheim & Scheid, 707 (Hel.)
Schmidt, L. H., Loo, T. L., Fradkin, R. & Hughes, H. B., 1025 (Mal.)
—— & Squires, W. L., 237 (Mal.)
Schmidt-Hoensdorf & Holz, J., 1000 (Prot.)
Schneider, J., (531) (Hel.)
——, Canet, J. & Dupoux, R., 664 (Mal.)
—— & Dupoux, R., 621 (Am.)
——, with Lavier, 115 (Mal.)
—— & Montezin, G., 274 (Am.)
——, —— & Biheu, O., 666 (Mal.)
Schnitker, M. A., Mattman, P. E. & Bliss, T. L., 173 (Def. Dis.)
Schoetter, M., with Fain & Ampe, 389 (Pl.)
Schoof, H. F. & Ashton, D. F., 591 (Mal.)
——, Siverly, R. E. & Coffey, J. H., 324 (Ent.)
Schorr, S. & Schwartz, A., 861 (Am.)
Schöttler, W. H. A., 79 *bis*, 181, 441, 796 (Vms.)
Schrader, E. A. & Westphal, A., 449 (Prot.)
Schubert, J. H. & May, M. C., 1045 (Am.)
Schubothe, H., Bock, M. & Wiesmann, E., 36 (Typh.)
Schuhardt, V. T. & Wilkerson, M., 52 (R.F.)
Schujman, S., 968 (Lep.)
Schultz, W., with Westphal, 651 (Prot.)
Schulz, K. H., 389 (Pl.)
Schwardt, H. H., with Pimentel & Dewey, 90 (Ent.)
Schwartz, A., with Schorr, 861 (Am.)
Schwartz, B. S., with Ercoli, Gosford, Carminati & Kley, 249 (Tryp.)
Schwartz, I. L., with Dole & Stall, 549 (Heat Str.)
Schwartz, J., with Helluy, 858 (Am.)
Schwarz, H., with Taylor & Moore, 296 (Hel.)
Schwarz, J. & Baum, G. L., 542 (Der.)
Schweinsberg, H., with Siegert, Peter & Simrock, 499 (Typh.)
Schwetz, J., 780, 782, 783, (1134) (Hel.)
——, Baumann, H. & Fort, M., 783 (Hel.)
——, with Baumann, H. & Fort, M., (1093) (Mal.)
——, Fort, M. & Baumann, H., 784 (Hel.)
—— & Stijns, J., 783 (Hel.)
Schwonzen, T., 172 (Hel.)
Scott, H., 327 (Reports, etc.)
Scott, J. A. & Blynn, E., (498) (Typh.)
——, with Macdonald, 1037 (Typh.)
——, Macdonald, E. M. & Terman, B., 789 (Hel.)
Scott, J. G., with Amies, Murray & Warren, 897 (Oph.)
Sculthorpe, H. H., with Jones & Maegraith, 756, 757 (Mal.)
Seal, S. C., 138, 139 (Pl.)
——, Ghosal, S. C. & Bose, P. N., (46) (Pl.)
——, —— & Ghosh, M. M., 395 (Chl.)
Seaton, D. R., 240 (Mal)
Sebai, I., with Gohar & Eissa, 878 (Hel.)
Secret, E., 1131 (Lep.)
Seidelin, R., with Morton & Stamm, 1117 (Am.)
Seki, T., with Arakawa, Kitamura & Kaneko, 801 (Oph.)
Semambo, Y. B., with Holmes, Stanier, Jones, Kyobe & Gee, 535 (Def. Dis.)
Sen, S., with Kvittingen, Cutler, Guevara, McCullough, Rose, Ford, Tampi, Lakshwir, Khan & Dass, 967 (Lep.)
Sen, S. C., 1155 (Ulc.)
Senà, J. A., 310 (Oph.)
Senda, N., with Fukushima, Uenoyama, Inui, Ishigami, Kariya, Naka, Iwasaki & Sakao, (439) (Haem.)
Seneca, H. & Rockenbach, J., 1033 (Tryp.)
Sénécal, J. & Ahmad, A., 151 (R.F.)
Sengupta, A. N., with Konar, 691 (Chl.)
Sengupta, K. P., with De, (695) (Am.)
——, with ——, Bhattacharyya & Konar, 757 (Bl.)
——, with —— & Chanda, 1116 (Chl.)
Sen Gupta, P. C. & Bhattacharyya, B., 608 (Leish.)
—— & Das Gupta, C. R., 130 (Leish.)
——, Das Gupta, N. N. & Bhattacharya, D L., 28 (Leish.)
Senior, N., with Jones & Landquist, 1119 (Am.)
Senior White, R. A. & Adhikari, A. K., 109 (Mal.)
Senior-White, R. A. & Lewis, G., (451) (Ent.)
Senoo, T. & Lincicome, D. R., 426, 427 (Hel.)
Senter, W. J., (431) (Hel.)
Sergent, Ed., 925 (Mal.)
—— & Collignon, E., 220 (Mal.)
—— & Poncet, A., 756 *bis*, 934 (Mal.), 959 (R.F.)
—— & Sergent, Et., 933 (Mal.)
Sergent, Et., with Sergent, 933 (Mal.)
Sersale di Cerisano, L., (771) (Am.)
Seto, S., with McMullen, Endo-Itabashi, Komiyama & Stone, 785 (Hel.)
Seward, J., with le Riche, Riordan, Smit, Ockerse, Best, Kinnear, Walker, du Toit, Gerdener, Steinbach & Drysdale, 714 (Def. Dis.)
Seydian, B., with Baltazard, Bahmanyar & Mofidi, 1041 (Pl.)
Sezer, F. N., 446 (Oph.)
Shaffer, J. G. & Washington, J. E., 956 (Am.)
Shah, I. A., with Rafi, 368 (Mal.)
Shah, M. A., 901 (Oph.)
Sharma & Bhatia, B. B., 641 (Haem.)
Sharma, M. I. D., with Dakshinamurty, 1001 *bis* (Ent.)
——, with Jaswant Singh & Pal, 753 (Mal.)
Sharp, E. A., with Payne, Villarejos, Reinertson & Wille, 481 (Mal.)
Sharpless, R. V., with Miller & Mallis, 808 (Ent.)
Shea, E., with Tosteson & Darling, (893) (Haem.)
Sheldon, W. H., Heyman, A. & Evans, L. D., 772 (R.F.)
Sheris, E., with Kausche, 135 (Typh.)
Sherry, S., McCarty, W. R. & Tillett, W. S., 399 (Am.)
Shibata, S., 358, 841 (Mal.)

Shih, B., with Tobie, Reardon, Bozicevich, Mantel & Thomas, 267 (Am.)
Shimizu, M., with Ritchie, Hunter, Kaufman, Pan, Nagano, Yokogawa, Szewczak, Hishinuma & Asakura, 881 (Hel.)
Shishido, A., with Kitaoka, Kato, Katsura, Ito, Tatami, Matsuzawa & Machida, 257 (Typh.)
——, with Kitaoka, Kato, Yoshida & Goto, 257 (Typh.)
——, with ——, Takemori & Jo, 610 (Typh.)
Shoho, C., with Innes, 1137 (Hel.)
Shookhoff, H. B., with Loughlin, Rappaport, Mullin, Wells & Joseph, 712 (Hel.)
——, with Wells, Mullin, Sterman, Loughlin & Rappaport, 639 (Hel.)
Shortt, H. E., 224, 354 (Mal.), 318 (Prot.), 1086 (Reports, etc.)
Shotton, D., with Silverberg, 305 (Haem.)
Shoucair, E. S., Gordon, C. C., Grant, L. S. & Hill, K. R., (1155) (Der.)
Shrum, R. C., Lanard, F. W. & Wilkerson, D. C., 927 (Mal.)
Shute, P. G., 355 (Mal.)
——, with Maryon & Lee, 477 (Mal.)
—— & Maryon, M., 358, 1095 (Mal.)
——, with Mattingly, Rozeboom, Knight, Laven, Drummond & Christophers, 651 (Ent.)
Sicca, G. T., 487 (Mal.)
Sie-Boen-Lian, 307 (Oph.)
Siegert, R., 385, (1035) (Typh.)
——, Peter, H., Simrock, W. & Schweinsberg, H., 499 (Typh.)
Sieh, P. K., with Tang, Chow, Wang & Chow, 702 (Hel.)
Sielski, S., with Murray, Pšorn, Djaković, Broz, Ljupša, Gaon, Pavlević & Snyder, 383 (Typh.)
Sigel, M. M., Weiss, L. B., Blumberg, N. & Doane, J. C., 762 (Typh.)
Siggia, S. & Mamola, P., (901) (Oph.)
Siguier, F., Feld, Piette, M., Welti, J. J. & Lumbroso, P., 882 (Hel.)
Siim, J. C., 1158 (Prot.)
Sikorska, S., with Wysocka & Kozar, (1156) (Prot.)
Siler, J. F., 99, 1088 (Reports, etc.)
d'Silva, C. B., with Ahuja, Brooks & Thomas, 1040 (Rab.)
——, Brooks, A. G., Thomas, A. K. & Ahuja, M. L., 1040 (Rab.)
de Silva, G., 165 (Hel.)
da Silva, O. J., with Forattini, 27 (Tryp.)
Silva, R., with Neghme, 47 (Am.)
Silva C., R., with Neghme, 144 (Am.)
——, with —— & Pilotti Avello, 705 (Hel.)
da Silva, T. L., 993 (Vms.)
——, with Unti, 605 (Tryp.)
Silva Goytia, R., (498), (763) (Typh.)
Silva Goytía, R., with Calero & Núñez, 1108 (Typh.)
Silva-Goytia, R. & Elizondo, A., 1037 (Typh.)
Silveira, H., with Passos, Baptista, Martins, Sampaio & Marques, 1126 (Lep.)
da Silveira, S. C., 702 (Hel.)
Silvera, W. D. & Jelliffe, D. B., 714 (Def. Dis.)
Silverberg, J. H. & Shotton, D., 305 (Haem.)
Silverman, M. S., Elberg, S. S., Meyer, K. F. & Foster, L., 1043 (Pl.)
Silvestroni, E. & Bianco, I., 794 (Haem.)
Simitch, T. & Pétrovitch, Z., 512 (Am.)
Simmonds, W. L., Martin, W. E. & Wagner, E. D., 65 (Hel.)
Simmons, J. S., Whayne, T. F., Anderson, G. W. & Horack, H. M., with Thomas, R. A., *et al.*, 741 (B.R.)
Simmons, S. W., 1159 (Ent.)
Simon, K., 800 (Oph.)
Simon, R., 140 (Pl.)
Simonet, P., 852 (Leish.), 1087 (Reports, etc.)
Šimović, L., Vesenjak-Zmijanac, J., Gaon, J., 37 (Typh.)
Simpson, I. A., 532 (Def. Dis.)
Simpson, J. C. E., with Lourie, Morley & Walker, 250 (Tryp.)
Simpson, T. W., 67 (Hel.)
Simrock, W., with Siegert, Peter & Schweinsberg, 499 (Typh.)
Singer, K., (77) (Haem.)
—— & Chernoff, A. I., 538 (Haem.)
Singh, J., Ramarkrishnan, S. P. & Prakash, S., 480 (Mal.)
Sinha, S. P., with Rudra & Chowdhury, 904 (Misc. Dis.)
Siniscal, A. A., 721 (Oph.)
Sisson, R. B., with King, Bartholomew, Geiser, Ventura, Wootton, Macfarlane & Donaldson, 437 (Haem.)
Siverly, R. E., with Schoof & Coffey, 324 (Ent.)
Sleeper, D. A., with Frohne, (555) (Ent.)
Slotta, K. & Primosigh, J., 1071 (Vms.)
Slotta, K. H. & Primosigh, J., (80) (Vms.)
Smadel, J. E., with Bailey, Ley, Diercks & Lewthwaite, 34 (Typh.)
——, Ley, H. L., Jr., Diercks, F. H., Paterson, P. Y., Wisseman, C. L., Jr. & Traub, R., 682 (Typh.)
Smadel, J. E., with Wisseman, Hahn, Jackson & Bozeman, 681 (Typh.)
——, with ——, Jackson, Hahn & Ley, 134 (Typh.)
Smallman, B. N., with Berck, 1010 (Ent.)
Smit, R., with le Riche, Riordan, Ockerse, Best, Kinnear, Walker, du Toit, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Smith, A., 390 (Pl.)
Smith, A. L., with Travis, 201 (Ent.)
Smith, C. H. & Morgenthau, J. E., (305) (Haem.)
Smith, C. N. & Cole, M. M., 13 (Mal.)
Smith, D., 565 (Reports, etc.)
Smith, D. A., with McGregor, 663 (Mal.)
——, with Walters, 988 (Def. Dis.)
—— & Woodruff, M. F. A., 434 (Def. Dis.)
Smith, F. E., with Gray, 722 (Heat Str.)
Smith, J. D. & Stoker, M. G. P., 259 (Typh.)
Smith, R. C., with Killough & Magill, 696 (Am.)
Smithburn, K. C., with Haddow, Dick & Lumsden, 260 (Y.F.)
Snowden, W. M., with Eddleman & Hale, 229 (Mal.)
Snyder, J. C., with Murray & Ofstrock, 610 (Typh.)
——, with ——, Pšorn, Djaković, Sielski, Broz, Ljupša, Gaon & Pavlević, 383 (Typh.)
Snyder, J. C., with Fuller, Murray, Ayres & Potash, 35 (Typh.)
——, with Karp, 763 (Typh.)
——, with Murray, Cohen, Jampol & Ofstrock, 681 (Typh.)
——, with ——, Djaković & Ljupša, 37 (Typh.)
——, with Neva, 1106 (Typh.)
Soares, R., with Muniz & Batista, 604 (Mal.)

Society of Friends of Lepers, 625 (Lep.)
Sodeman, W. A., d'Antoni, J. S. & Doerner, A. A., 695 (Am.)
——, with Beaver, 884 (Hel.)
——, Chaudhuri, R. N. & Bannerjee, D., 1046 (Am.)
——, Doerner, A. A., Gordon, E. M. & Gillikin, C. M., 50 (Am.)
—— & Jung, R. C., 527 (Hel.)
——, Lahiri, M. N. & Panja, G., 1155 (Ulc.)
Sohier, R., with Marie-Suzanne & Noël, 55, 522 (Lep.)
Sokhey, S. S., (1112) (Pl.)
Solomon, M. E., 450 (Ent.)
Soman, D. W., with Felsenfeld, Waters & Ishihara, 142 (Chl.)
van Someren, E. C. C., with Haddow, Lumsden, Harper & Gillett, 85 (Ent.)
van Someren, G. R. C., 770 (Pl.)
Sommer, H., with Baker, Foster, Meyer & Meyer, 616 (Pl.)
Sommerville, J., 774 (Lep.)
Soong, H. & Ho, E. A., 761 (Leish.)
Soong, H. Y. & Ho, E. A., 851 (Leish.)
Soper, F. L., 855 (Y.F.), 996 (Misc. Dis.)
Sorsby, A., 898 (Oph.)
Sotolongo, F., with Basnuevo, Cowley Chávez, Blanco Rabassa & Achkar, (293), 429 (Hel.)
Souidan, M. Z. A., 63 (Hel.)
South Pacific Commission, 165, (787), 787 (Hel.), 1068 (Def. Dis.)
Southern Rhodesia: see Rhodesia, Southern
de Souza, A. R., 406 (Lep.)
de Souza-Araújo, H. C., 155, 521 (Lep.)
—— & de Sá, J. G., 773 (Lep.)
Souza Campos, N., 873 (Lep.)
de Souza Lima, L., with Sampaio & Nahas, 873 (Lep.)
Spear, P. J., 450 (Ent.)
Spena, A., 379 (Tryp.)
Spencer, M. M., with Barnett, (265) (Pl.)
Sprent, J. F. A., 786 (Hel.)
Spriggs, J. B., with Dorset, 1045 (Am.)
Sprunt, D. H., with McVay, 865 (Am.)
——, with —— & Evans, 401 (Am.)
Spurr, E. D., with Hills, 509 (Pl.)
Squire, F. A., 26, 376, 1029 (Tryp.)
Squires, B. T., 534 (Def. Dis.), (1149) (Haem.)
Squires, W. L., with Schmidt, 237 (Mal.)
Srivastava, S. B., with Lal, 88 (Ent.)
Stabler, R. M., 807 (Ent.)
Stafford, J. L., with Hill, Rhodes & Aub, 437 (Def. Dis.)
Stahler, N., with Terzian & Ward, 486, 846 (Mal.)
Stakes, F. H., with Gear, Wolstenholme & Harwin, 1107 (Typh.)
Stall, B. G., with Dole & Schwartz, 549 (Heat Str.)
Stamm, W. P., with Morton & Seidelin, 1117 (Am.)
Standen, H., with Armstrong & Bradbury, 93 (Ent.)
Standen, O. D., 414, 778, 1054 (Hel.)
Stanier, M. W., with Holmes, Semambo, Jones, Kyobe & Gee, 535 (Def. Dis.)
Stanković, I., with Mandic, 308 (Oph.)
——, with Stanković, 553 (Prot.)
Stanković, M. & Stanković, I., 553 (Prot.)
Stannus, H. S., 565 (Reports, etc.)
Starr, L. E., (688) (Rab.)
Stauber, L. A., Walker, H. A. & Richardson, A. P., 124 (Mal.)
Steen, E., 1076 (Prot.)
Steen, E., with Kåss, 727 *bis* (Prot.)
——, with Matheson & Thjøtta, 805 (Prot.)
van Steenis, P. B., with Roovers, 399, 863 (Am.)
Steer, A., Burns, K. F. & Olin, W. G., Jr., 44 (Rab.)
Stein, R. J., with Stuermer & Randall, 192 (Prot.)
Steinbach, L., with le Riche, Riordan, Smit, Ockerse, Best, Kinnear, Walker, du Toit, Gerdener, Seward & Drysdale, 714 (Def. Dis.)
Steinbrinck, W., 194 (Prot.)
Steinmann, J., 136 (Typh.)
Stenburg, R. L., with Fay & Ernst, 1083 (Ent.)
Stephenson, W., with Hobson & Beadle, (707) (Hel.)
——, with —— & Eden, (707) (Hel.)
Sterman, M. M., with Wells, Shookhoff, Mullin, Loughlin & Rappaport, 639 (Hel.)
Stern, T. N., with McVay & Laird, 695 (Am.)
Sternburg, J. & Kearns, C. W., (562), 1163 (Ent.)
Steyn, J. J., 677 (Tryp.)
Stijns, J., 975 (Hel.)
——, with Schwetz, 783 (Hel.)
Stirewalt, M. A., with Evans, 779 (Hel.)
——, Kuntz, R. E. & Evans, A. S., 64 (Hel.)
——, with Olivier, 1056 (Hel.)
Stohlman, E. F., 159 (Hel.)
Stojanovich, C. J., with Ferris, (654) (Ent.)
Stoker, M. G. P. & Marmion, B. P., 683 (Typh.)
——, with Smith, 259 (Typh.)
Stone, H. H., Tool, C. D. & Pugsley, W. S., 851 (Leish.)
Stone, P. R., with McMullen, Endo-Itabashi, Seto & Komiyama, 785 (Hel.)
Stransky, E., Dauis-Lawas, D. & Lawas, I., 75 (Def. Dis.)
——, —— & Vicente, C., 76 (Def. Dis.)
—— & Dauis-Lawas, D. F., 179 (Haem.)
Straub, W., 906 (Prot.)
Strobel, W., 321 (Prot.)
Strode, G. K. *et al.*, 337 (B.R.)
Strome, C. P. A., with Sapero & Lawless, 727 (Prot.)
Struthers, E. A., 750 (Mal.)
Stubbs, F. H. & Dixon, J. L., 798 (Der.)
Studer, A. & Fust, B., 637 (Hel.)
Studies from Inst. Med. Res. Federation of Malaya, 911 (Reports, etc.)
Stuermer, V. M., Stein, R. J. & Randall, J. H., 192 (Prot.)
Sturgeon, P., Itano, H. A. & Valentine, W. N., 718 (Haem.)
Su, S. C., 326 (Ent.)
Suárez, R. M., 991 (Sp.)
——, with Diéz Rivas, Hernández Morales & Pérez Santiago, 991 (Sp.)
Suarez Torres, G., with Garcia Sanchez, (945) (Rab.)
Subramaniam, R., 96 (Reports, etc.)
Such, M., with Orbaneja & Perez, 1131 (Lep.)
Sukegawa, N., with Harada, Miyagawa, Tuboi & Nozawa, 139 (Pl.)
Sullivan, B. H., Jr. & Bailey, F. N., 273 (Am.)
Sultan, Z. M., (970) (Hel.)
Sumerford, W. T., with Chen, (95) (Ent.)
——, Fay, R. W., Goette, M. B. & Allred, A.M., 562 (Ent.)
——, Goette, M. B., Quarterman, K. D. & Schenck, S. L., 91 (Ent.)
Sumiyoshi, K., with Tanaka, Ikuzawa & Moriya, (857) (Pl.)

Sun, J. T., with Sun, 1083 (Ent.)
Sun, Y. & Sun, J. T., 1083 (Ent.)
Sureau, P., with Floch & Lecuiller, 1129 (Lep.)
Suri, R. M., with Khan & Nair, 363 (Mal.)
——, with Najib Khan, Janaki & Nair, 663 (Mal.)
Surrey, A. R., Suter, C. M. & Buck, J. S., (1133) (Hel.)
Suter, C. M., with Surrey & Buck, (1133) (Hel.)
Suter, H., (130) (Tryp.)
Suter, L. S., with Sutcliff & Green, 400 (Am.)
Sutcliff, W. D., Green, F. D. & Suter, L. S., 400 (Am.)
Sutton, T. S., with Devadas, 76 *bis* (Def. Dis.)
Suzuki, K., 764 (Typh.)
Svanborg, N. A., 804 (Prot.)
Swamy, T. V. & Dutta, B. B., (1145) (Haem.)
Swan, L. L., with Grabstald, 1128 (Lep.)
Swanson, L. E., with Battе 526 (Hel.)
Swaroop, S., 390, 392 (Chl.)
—— & Raman, M. V., 140 (Chl.)
Swartzwelder, J. C. & Avant, W. H., 1122 (Am.)
Sweetman, H. L., with Moore & Toczydlowski, 199 (Ent.)
Swellengrebel, N. H., 589 (Mal.)
Swynnerton, G. H. & Hayman, R. W., 331 (Reports, etc.)
v. Sydow, G., 804 (Prot.)
Symes, C. B., 204, 1163 (Ent.), 356 (Mal.)
Symmers, D., 64 (Hel.)
Szewczak, J. T., with Hunter, Ritchie, Kaufman, Pan, Yokogawa, Ishii, Weber, Asakura, Hishinuma & Williams, 633 (Hel.)
——, with Hunter, Ritchie, Nagano, Ishii, Murakuni, Pan, Weber & Asakura, 523 (Hel.)
——, with Ritchie, Hunter, Kaufman, Pan, Nagano, Yokogawa, Hishinuma, Shimizu & Asakura, 881 (Hel.)
——, with Ritchie, Hunter, Pan, Izumi, Weber, Hishinuma & Asakura, 523 (Hel.)
Szumlewicz, A. P. & Kemp, H., 1057 (Hel.)
Szymkowicz, R. T., with Knutson, 857 (Pl.)

T

Tabbara, R., with Azar & Pipkin, 413 (Hel.)
Tabone, V., 312 (Oph.)
Taborda, A. R., Taborda, L. C., Williams, J. N., Jr. & Elvehjem, C. A., 643, 796 (Vms.)
Taborda, L. C., with Taborda, Williams & Elvehjem, 643, 796 (Vms.)
Tachibana, K., with Arakawa, (1069) *bis* (Def. Dis.)
——, with —— & Ogasawara, (1069) (Def. Dis.)
——, with —— & Yoshida, (1069) (Def. Dis.)
Takahashi, F., with Arakawa & Wada, 641 (Def. Dis.)
Takata, I., 423 (Hel.)
Takemori, N., with Kitaoka, Shishido & Jo, 610 (Typh.)
Takeyama, O., 286 (Hel.)
Tamblyn, E. E., with Newcomer & Wright, 995 (Der.)
Tampi, R. B., with Kvittingen, Cutler, Guevara, McCullough, Rose, Ford, Sen, Lakshwir, Khan & Dass, 967 (Lep.)
Tanabe, H., with Hunter & Ritchie, 416 (Hel.)
——, with ——, ——, Nagano, Pan & Yokogawa, 785 (Hel.)
Tanaka, C., with Mitsui, 187 (Oph.)
——, with ——, Iwashige & Yamashita, 307 (Oph.)
Tanaka, H., Ikuzawa, M. & Moriya, S., (857) (Pl.)
——, ——, —— & Sumiyoshi, K., (857) (Pl.)
Tang, C. C., Chow, C. C., Wang, P. C., Sieh, P. K. & Chow, S. L., 702 (Hel.)
Tanganyika, 675 (Tryp.)
Tange, H., with Kano & Sato, (92) (Ent.)
Tani, T. G., with Blanton, 255 (Typh.)
Taniguchi, T., Fujino, T., Inoki, S. & Okuno, Y., 263 (Den.)
Tanimura, T. & Nishimura, S., 969 (Lep.)
Tasker, P. W. G., 715 (Haem.)
Tatami, S., with Kitaoka, Shishido, Kato, Katsura, Ito, Matsuzawa & Machida, 257 (Typh.)
Tate, P., 22 (Tryp.)
Tatum, A. L., with Hanson, 846 (Mal.)
Taufflieb, R., with Grenier, (911) (Lab.)
Taylor, D. J. & Greenberg, J., 1046 (Am.)
——, —— & Josephson, E. S., 1122 (Am.)
——, with Josephson, Greenberg & Bami, 115 (Mal.)
——, Josephson, E. S., Greenberg, J. & Coatney, G. R., 674 (Mal.)
Taylor, D. R., Moore, A. M. & Schwarz, H., 296 (Hel.)
Taylor, E. H., (541), (796) (Vms.)
Taylor, L. R., (85) (Ent.)
Taylor, W. H., 188 (Heat Str.)
Tebbutt, A. H., 1070 (Haem.)
Teesdale, C., 869 (R.F.)
Teichmann, W., 174 (Def. Dis.)
Telkkä, A., Wahlström, S. & Koulumies, R., 527 (Hel.)
Teraskeli, H. & Oravisto, T., 308 (Oph.)
Terman, B., with Scott & Macdonald, 789 (Hel.)
Terzian, L. A., Stahler, N. & Ward, P. A., 846 (Mal.)
——, Ward, P. A. & Stahler, N., 486 (Mal.)
Texier, with Joulia & Petges, 403 (Lep.)
Thalhammer, O., 191, (804) (Prot.)
Théodorides, J., 731 (Ent.)
Thetford, N. D., with Otto, Brown & Bell, 982 (Hel.)
van Thiel, P. H., (557) (Ent.)
—— & Winoto, R. M. P., 369 (Mal.)
Thienpont, (130) (Tryp.)
Thiermann, E., 495 (Tryp.)
——, with Christen, Agosin, Pino, Jarpa & Neghme, (650) (Prot.)
——, with Neghme, Badínez, Jarpa, Agosin & Christen, 1104 (Tryp.)
——, with ——, Pino, Christen & Agosin, 1157 (Prot.)
Thillainathan, P., with Schmid, 409 (Lep.)
Thjøtta, T., with Matheson & Steen, 805 (Prot.)
Thomas, A. K., with Ahuja, d'Silva & Brooks, 1040 (Rab.)
——, with d'Silva, Brooks & Ahuja, 1040 (Rab.)
Thomas, E. H., with Bozicevich, Tobie, Hoyem & Ward, 431 (Hel.)
——, with Tobie, Reardon, Bozicevich, Shih & Mantel, 267 (Am.)
Thomas, L. J., 1145 (Hel.)
Thomas, R. A., with Simmons, Whayne, Anderson, Horack & collaborators, 741 (B.R.)
Thomas, T. C. E., 359 (Mal.)
Thompson, J. H., Jr., with Magath, 790 (Hel.)
Thompson, M. D. & Trowell, H. C., 891 (Def. Dis.)

Thompson, P. E. & Reinertson, J. W., 511 (Am.)
Thompson, R. P., with Brown & Sarkaria, 196 (Ent.)
——, with ——, Twinn & Cutkomp, 451 (Ent.)
Thomson, J. & Keay, K. R., 532 (Def. Dis.)
Thooris, G. C. & Beye, H. K., 167 (Hel.)
Thurston, J. P., with Hawking, 931 (Mal.), 1141 (Hel.)
——, with ——, Ormerod & Webber, 1143 (Hel.)
Thys, A., with Rasson, (306) (Der.)
——, with Vanbreuseghem, Vandepitte & Windey, (185), (Der.)
van Tiel, N., 1009, 1085 (Ent.)
Tillett, W. S., with Sherry & McCarty, 399 (Am.)
Tipton, V. J., with Ley, Sayer, Hobson, Vanreenen, Frick, Ballard & Traub, 274 (Am.)
Tisseuil, J., 961 (Lep.)
Tobar, R. G., 183 (Vms.)
Tobie, E. J., 848 (Tryp.)
Tobie, J. E., with Bozicevich, Thomas, Hoyem & Ward, 431 (Hel.)
——, with Reardon, L. V., Bozicevich, J., Shih, B., Mantel, N. & Thomas, E. H., 267 (Am.)
Toczydlowski, A. H., with Moore & Sweetman, 199 (Ent.)
Toda, T. & Nakagawa, Y., 944 (Den.)
du Toit, D., with le Riche, Riordan, Smit, Ockerse, Best, Kinnear, Walker, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Tokura, N., 1024 (Mal.)
—— & Kawahata, H., 374 (Mal.)
Tondevold, E. L., with McRary & Noble, 937 (Tryp.)
Tool, C. D., with Stone & Pugsley, 851 (Leish.)
Toomb, C. J., with Lennette, Clark & Jensen, 1039 (Typh.)
Toranzos, L. B., 379 (Tryp.)
——, with Romaña, 381 (Tryp.)
——, with —— & Marcolongo, 426 (Hel.)
Torrealba, J. F., 380 (Tryp.)
Torrella Gil, D. E., (1049) (Lep.)
Torres, C. M., Duarte, E., Guimarães, J. P. & Moreira, L. F., 720 (Der.)
Torres Cañamares, F., (909) (Ent.)
Torres Estrada, A., 841 (Mal.)
Toshioka, S., with Barnett, 87 (Ent.)
Tosteson, D. C., Shea, E. & Darling, R. C., (893) (Haem.)
Toulant, M., with Moline, Toulant & Larmande, 720 (Oph.)
——, with Toulant & Larmande, 80, 187, 545 (Oph.)
Toulant, P., Larmande, A. & Toulant, M., 80, 187, 545 (Oph.)
——, with Moline, Larmande & Toulant, 720 (Oph.)
——, Robineau, G. & Puyuélo, R., 81 (Oph.)
Touzin, R., with Blanc & Villa, 1118 (Am.)
Toyama, M., with Ikeda, 803 (Oph.)
Tran-Anh, with Huard & Vu-Cong-Hoe, 888 (Hel.)
Trans. Roy. Soc. Trop. Med. & Hyg., 1006 (Ent.)
Trapido, H., 15, 478 (Mal.)
Tratman, E. K., 514 (Ys.)
Traub, F. B., Friedemann, U., Brasch, A. & Huber, W., with Kaplan, H., 507 (Rab.)
Traub, R., with Audy, (200) (Ent.)
—— & Johnson, P. T., (654) (Ent.)
——, with Ley, Sayer, Hobson, Vanreenen, Tipton, Frick & Ballard, 274 (Am.)
Traub, R., with Smadel, Ley, Diercks, Paterson & Wisseman, 682 (Typh.)
——, Wisseman, C. L., Jr. & Audy, J. R., 1006 (Ent.)
Travis, B. V., 13 (Mal.)
—— & Smith, A. L., 201 (Ent.)
Tredre, R. F., 1148 (Haem.)
Trejos, A., with Castro, 306 (Der.)
—— & Echandi, C. A., 254 (Leish.)
Trembley, H. L., Greenberg, J. & Coatney, G. R., 122 *bis* (Mal.)
——, with Greenberg & Coatney, 122 (Mal.)
Trémolières, J., with Bergouniou, 793, 1068 (Def. Dis.)
Treviño Villaseñor, A., with Gutiérrez Ballesteros, 511 (Am.)
Tribedi, B. P., with De & Sarkar, 618 (Chl.)
Trinidad Govt., 16 (Mal.)
Tronca, M., 1047 (Am.)
Trope, R. A., 900 *bis* (Oph.)
Trowell, H. C., 275 (R.F.), 448 (Misc. Dis.), 536 (Haem.)
——, with Thompson, 891 (Def. Dis.)
Trüb, C. L. P. & Wanjura, H., 219 (Mal.)
Ts'Ao, Y., with Chung, Chow & Chang, 29 (Leish.)
Tseng Sheng & Wu, I., 228 (Mal.)
Tsuruta, K., with Akimoto, Fukushima, Yasuda & Maruyama, (1061) (Hel.)
Tuboi, T., with Harada, Miyagawa, Sukegawa & Nozawa, 139 (Pl.)
Tupas, A. V. & Dauis-Lawas, D. F., 49 (Am.)
Turhan, B., 988 (Def. Dis.)
Tweedie, M. M. F., 135 (Typh.)
Twinn, C. R., 1081 (Ent.)
——, with Brown, Thompson & Cutkomp, 451 (Ent.)
Tzanck, A., Basset, A. & Salomon, L., 1129 (Lep.)

U

Uenoyama, T., with Fukushima, Senda, Inui, Ishigami, Kariya, Naka, Iwasaki & Sakao, (439) (Haem.)
Ulewicz, K., 132 (Typh.)
Ulrich, E., with Young, 720 (Der.)
Ungley, C. C., (76) (Def. Dis.)
Unsworth, K. & Nesbitt, P. E., (936) (Tryp.)
Unti, O. & da Silva, T. L., 605 (Tryp.)
——, with Wasicky, 1135 (Hel.)
Urbach, H., with Herzberg, Lück & Hartmann-Heyn, 40, 500 (Typh.)
Uribe, C., with Groot & Renjife, 760 (Tryp.)
Urso, B., 400 (Am.)
Urteaga, O., with Payne, 40 (Bart.)

V

Vachon, M., (1073) (Vms.)
Vaisman, A., with Levaditi, 1101 (Mal.)
——, with —— & Henry-Eveno, (856) *bis* (Rab.)
Valentine, W. N., with Sturgeon & Itano, 718 (Haem.)
Valliant, J., with Victor, Raymond, Wagner & Pollack, 501 (Typh.)

Vanbreuseghem, R., Vandepitte, J., Thys, A. & Windey, W., (185) (Der.)
Vandenberghe, J., (705) (Hel.)
van den Berghe, L., 982 (Hel.)
—— & Chardome, M., 788 (Hel.)
—— & Janssen, P., 304 (Haem.)
Vandenplas, A., (1074) (Heat Str.)
Vandepitte, J., with Vanbreuseghem, Thys & Windey, (185) (Der.)
Vandepitte, J. M. & Pieters, G., (1150) (Haem.)
van der Hoeven, J. A., 981 (Hel.)
van der Kuyp, E., 63 (Hel.)
van der Scheer, J., with Koprowski & Black, 507 (Rab.)
Vanëk, J., 194 (Prot.)
—— & Jírovec, O., 908 (Prot.)
Vanni, V., 145 (Am.)
Vanreenen, R. M., with Ley, Sayer, Hobson, Tipton, Frick, Ballard & Traub, 274 (Am.)
Varas Samaniego, J. M., 646 (Oph.)
Varela, G., with Bustamante & Roch, 135 (Typh.)
——, with Rein, Kitchen & Marquez, 542 (Der.)
Vargues, R., 602 (Mal.)
—— & Fabiani, G., 669, 670 (Mal.)
——, with Fabiani, 670, (933) (Mal.)
——, Fabiani, G. & Fulchiron, G., 602 (Mal.)
——, with Fabiani, Fulchiron & Grellet, 485 (Mal.)
——, with ——, ——, —— & Verain, 484 (Mal.)
——, with ——, Grellet & Clausse, 484 (Mal.)
——, with ——, Jahier & Fulchiron, 486 (Mal.)
Vásquez, M., J., with Schenone, Pizzi, Badínez & Correa, (1103) (Tryp.)
Vaucel, 461 (B.R.)
Vaughn, J., 638 (Hel.)
Vázquez Guzmán, D., 62 (Hel.)
Veciana, J. A., with Curbelo & Márquez, 33 (Typh.)
Veeraraghavan, N., 505 (Rab.)
de Velasco Guzmán, R., Amado Ledo, E. & Gómez Barry, H., 511 (Am.)
Velaudapillai, T., with Schmid & Jayasundera, 1109 (Typh.)
Velazquez, J., with Ruiz-Sanchez, Casillas, Paredes & Riebeling, 597 (Mal.)
Venkat Rao, V., 924 (Mal.)
Venkatachalam, P. S., with Gopalan, Rao & Menon, 987 (Def. Dis.)
Venkataramanan, K., 121 (Mal.)
Venkatraman, K. V., with Ahuja, Krishnan & Pandit, 394 (Chl.)
Ventura, S., with King, Bartholomew, Geiser, Wootton, Macfarlane, Donaldson & Sisson, 437 (Haem.)
Verain, A., with Fabiani, Vargues, Fulchiron & Grellet, 484 (Mal.)
Verástegui Cordero, H., (762) (Typh.)
Vercammen-Grandjean, P. H., 777, 781 (Hel.)
Verder, E., with Reardon & Rees, 860 (Am.)
Verhaegen, P. & Pieters, G., (1102) (Tryp.)
Verlinde, J. D. & Makstenieks, O., 193 (Prot.)
Vermeil, C., 777 (Hel.)
Verna, F., 633 (Hel.)
Vernier, J., with Camain, Navarranne & Ayite, (1133) (Hel.)
Verolini, F., with Corradetti, 371 (Mal.)
Verron, G., with Reiss, 906 (Prot.)
Vertueux, G., with Montestruc & Saint-Cyr, 314 (Ulc.)
Vervent, G., with Colas-Belcour & Néel, 698 (R.F.)
Vesenjak-Zmijanac, J., with Šimović & Gaon, 37 (Typh.)
Vialat, C., with Béquignon, 1041 (Rab.)
Vicente, C., with Stransky & Dauis-Lawas, 76 (Def. Dis.)
Vickers, M. A., with Fallis & Davies, 488 (Mal.)
Victor, J., Raymond, R., Valliant, J. & Wagner, J. C. & Pollack, A. D., 501 (Typh.)
Victoria, V., 311 (Oph.)
Vielle, A., 956 (Am.)
Vila Coro, A., 230 (Mal.)
Villa, T., with Blanc & Touzin, 1118 (Am.)
Villarejos, V. M., with Payne, Sharp, Reinertson & Wille, 481 (Mal.)
Villarejos M., V. M., 482 (Mal.)
Villela, E., 645 (Der.)
Vincent, M. & Liétar, J., 378 (Tryp.)
Vincke, I., with Rodhain, 932 (Mal.)
Vincke, I. H., 751 (Mal.)
Visani, A. & Andreoni, G., 688 (Rab.)
Viswanathan, D. K., 1022 *bis* (Mal.)
—— & Gadre, S. B., 118 (Mal.)
——, Ramachandra Rao, T., Halgeri, A. V. & Karandikar, V. S., 359 (Mal.)
——, —— & Juneja, M. R., 118 (Mal.)
Vitullo, D., 1099 (Mal.)
Vives Sabater, J., (945) (Rab.)
Vogel, R. A. & Conant, N. F., 798 (Der.)
de Vries, E. & van Wermeskerken, W. M., 505 (Rab.)
Vu-Cong-Hoe, 887 (Hel.)
——, with Huard & Tran-Anh, 888 (Hel.)

W

Wada, S., with Arakawa & Takahashi, 641 (Def. Dis.)
Wade, H. W., 519, 626 (Lep.)
—— & Ledowsky, V., 963 (Lep.)
Wagner, E. D., with Simmonds & Martin, 65 (Hel.)
Wagner, J. C., with Victor, Raymond, Valliant & Pollack, 501 (Typh.)
Wahba, E. A., (496) (Leish.)
Wahi, P. N. & Arora, M. M., 925, 926 (Mal.)
Wahlström, S., with Telkkä & Koulumies, 527 (Hel.)
Wako, H., with Sato, (641) (Def. Dis.)
Waldman, S., with Frumin & Morris, 1071 (Haem.)
Walker, A. R. P., with le Riche, Riordan, Smit, Ockerse, Best, Kinnear, du Toit, Gerdener, Seward, Steinbach & Drysdale, 714 (Def. Dis.)
Walker, H. A., with Stauber & Richardson, 124 (Mal.)
Walker, J. M., with Lourie, 250 (Tryp.)
——, with ——, Morley & Simpson, 250 (Tryp.)
Walker, J. R., with Clark, Bogucki, Lennette & Dean, 38 (Typh.)
Walker, O. L., with Irons, Eads, Johnson & Norris, 499 (Typh.)
Wall, W. J., with Yoeli, 372, 932 (Mal.)
Wallace, R. B., 231 (Mal.)
Walters, J. H. & Smith, D. A., 988 (Def. Dis.)
Wang, C. K., with Hsü, Li, Fan & Huang, 878 (Hel.)
Wang, P. C., with Tang, Chow, Sieh & Chow, 702 (Hel.)

Wang, W., 148 (Am.)
Wanjura, H., with Trüb, 219 (Mal.)
Wanson, M., 364 (Mal.), 1005 (Ent.)
Ward, P. A., with Terzian & Stahler, 486, 846 (Mal.)
Ward, S. B., with Bozicevich, Tobie, Thomas & Hoyem, 431 (Hel.)
Wardle, R. A. & McLeod, J. A., 1011 (B.R.)
Warnock, R. G., with Grundmann & Newson, (1102) (Mal.)
Warren, R. St. H., with Amies, Murray & Scott, 897 (Oph.)
Washington, J. E., with Shaffer, 956 (Am.)
Wasicky, R. & Unti, O., 1135 (Hel.)
Wasserman, C. F., Phelps, V. R. & Hertzog, A. J., 1070 (Haem.)
Waterlow, J. C., 435, 436 (Def. Dis.)
Waters, T., with Felsenfeld, Soman & Ishihara, 142 (Chl.)
Watsford, S. D., 656 (Reports, etc.)
Watson, A. G., with Henry, Mansour & Zaki, 851 (Leish.)
Watson, H. J. C., with Desowitz, 936, (936) (Tryp.)
Watson, J. M., 413, 971 (Hel.)
——, Fawzi, M. & Damluji, S., 1133 (Hel.)
Watson, R. B., with Chang & Chow, 110 (Mal.)
——, with Chow & Chang, 111 (Mal.)
—— & Liang, K. C., 223 (Mal.)
——, Paul, J. H., Chow, L. P. & P'Eng, R. Y., 12 (Mal.)
Webb, L. J., (812) (Reports, etc.)
Webber, W. A. F., with Hawking, Ormerod & Thurston, 1143 (Hel.)
Weber, R. E., with Hunter, Ritchie, Kaufman, Pan, Yokogawa, Ishii, Szewczak, Asakura, Hishinuma & Williams, 633 (Hel.)
——, with Hunter, Ritchie, Nagano, Ishii, Murakuni, Pan, Szewczak & Asakura, 523 (Hel.)
——, with Ritchie, Hunter, Pan, Szewczak, Izumi, Hishinuma & Asakura, 523 (Hel.)
Weinbach, E. C., with von Brand, Weinstein & Mehlman, 1067 (Hel.)
Weinstein, P. P. & Appelget, J. G., 1136 (Hel.)
——, with von Brand, Mehlman & Weinbach, 1067 (Hel.)
Weiss, L. B., with Sigel, Blumberg & Doane, 762 (Typh.)
Weiss, W. W., with Luongo & Reid, 432 (Hel.)
Welbourn, H. F., 297 (Def. Dis.)
Welch, S. F., with Quinby, 923 (Mal.)
Wells, H. S., 294, 790 (Hel.)
——, with Loughlin, Rappaport, Mullin, Joseph & Shookhoff, 712 (Hel.)
——, with ——, Rice, Rappaport, Joseph & Rene, 751 (Mal.)
——, Shookhoff, H. B., Mullin, W. G., Sterman, M. M., Loughlin, E. H. & Rappaport, I., 639 (Hel.)
Wells, I. C., with Neel & Itano, 176 (Haem.)
Wells, W. H., with Kuntz, 973 (Hel.)
Welsh, H. H., Lennette, E. H., Abinanti, F. R. & Winn, J. F., 386 (Typh.)
——, with Clark, Romer, Holmes, Lennette & Abinanti, 38 (Typh.)
——, with Lennette, 38 (Typh.)
Welti, J. J., with Siguier, Feld, Piette & Lumbroso, 882 (Hel.)
Weng, H., with Chung, Hou & Huang, 66 (Hel.)
Wenger, H., 864 (Am.)
Werle, E. & Ringler, W., (165) (Hel.)
van Wermeskerken, W. M., with de Vries, 505 (Rab.)
Wertman, K., Crisley, F. D. & Sarandria, J. L., 1107 (Typh.)
—— & Sarandria, J. L., 256 (Typh.)
West, A. S., 1080 (Ent.)
—— & Jenkins, D. W. (555) (Ent.)
West, L. S., 735 (B.R.)
The West African Medical Journal, 568 (Reports, etc.)
West Indian Med. J., 342 (B.R.)
Westphal, A., 320 (Prot.)
—— & Bauer, F., 905 (Prot.)
——, with Otten & Kajahn, 190, 650 (Prot.)
——, with —— & Piekarski, (191) (Prot.)
——, with Schrader, 449 (Prot.)
—— & Schultz, W., 651 (Prot.)
Weyer, F., 255, 762, (943), 1036 *bis* (Typh.)
——, with Binde, Kramer & Preuss, 497 (Typh.)
Wharton, G. W., Jenkins, D. W., Brennan, J. M., Fuller, H. S., Kohls, G. M. & Philip, C. B., 93 (Ent.)
Wharton, R. H., 360, 361 (Mal.)
——, with Reid, 1100 (Mal.)
Whayne, T. F., with Simmons, Anderson, Horack, Thomas & collaborators, 741 (B.R.)
Wheate, H., 279 (Lep.)
Wheate, H. W., 404, 774 (Lep.)
Wheatley, W. B., 146 (Am.)
Whellan, J. A., 676 *bis* (Tryp.)
Whitfeld, P. R., 931 (Mal.)
Whittington, R. M., with Harrison, 513 (R.F.)
Wicht, W. C., with Larson, Philip & Hughes, 265 (Pl.)
Wiesmann, E., 766 (Typh.)
——, with Schubothe & Bock, 36 (Typh.)
Wigand, R., with Peters, 854 (Bart.)
Wigglesworth, A., 558 (Ent.)
Wilcox, A., 113 (Mal.)
de Wildeman, E., with Pynaert, L., (1049) (Lep.)
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